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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE
INSTITUTION OF BRITISH FOUNDRYMEN AND THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION.

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The I.B.F. Birmingham Convention.

There is every reason to believe that, perhaps for the first time in British foundry history, we are to have a representative gathering of foundrymen. All the elements necessary to the success of the Convention have been included in the programme. First and foremost, there is the Exhibition, which will be a revelation to many of the smaller foundries, as there will be moulding machines of every type for them to compare with their antiquated methods, all the most modern cupolas for them to consider in relation to their converted boiler shells, and numerous labour-saving appliances to be regarded in the light of their present wasteful methods.

Then as a centre, no better place than Birmingham could be found, as it is in the heart of the foundry industry of the country.

The Papers to be presented are extremely comprehensive, and every live foundryman will find something of direct application to his own practice, whether he be interested in steel, grey iron, or non-ferrous branches of foundry work.

Another factor of equal importance is the informal exchange of ideas, but even this cannot possibly eclipse the benefit which is bound to accrue from hearing Papers on vital subjects discussed by the most prominent men of the industry. The programme, which has already been outlined in our issues of March 30, April 6 and 13 should be carefully studied by all who have not yet finally decided to participate.

The competitions, details of which we have already published, are of the utmost importance, as they have for their object the interesting of the apprentice in his craft. It is universally acknowledged that any help that can be given in this direction is more than welcome.

The visits to the various works in the Birmingham district will be of the greatest interest to the visitors, as they are to concerns of the highest standing.

Whilst the main objects of the Convention and Exhibition are educational and business respectively, the social side has not been overlooked, as reference to the notice will show. In fact, the arrangements made for the entertainment of visitors are on a scale never previously attempted by the Institution. In plain English, foundrymen have everything to gain and nothing to lose by participation in the Conference. Our experience of foundrymen is that they have a habit of putting off notifying secretaries of their intention to be present at a gathering until the last moment. We are sure that it will facilitate the work of the Birmingham Committee if those intending to be present will inform Mr. Thos. Vickers, of Central House, New Street, Birmingham, at the earliest possible moment.

The Honorary Secretary of the Reception Committee has recently circularised the officers of the Branches, pointing out that no visits can be made to any function without a ticket, and that all tickets will be issued on May 30—no applications will be considered after that date.

British Iron and Steel Output for April.

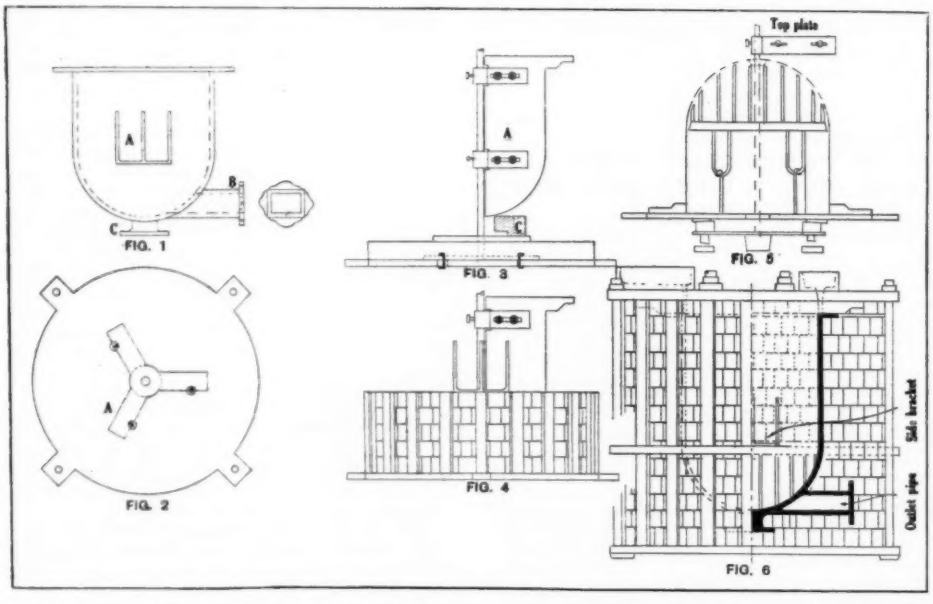
The National Federation of Iron and Steel Manufacturers, in their monthly report, state that the production of pig-iron in April amounted to 394,300 tons, or 4,500 tons more than in March. This figure compares with an average of 669,500 tons monthly in 1920 and 855,000 tons monthly in 1913. The production included 152,900 tons of hematite, 124,700 tons basic, 80,800 tons foundry and 16,700 tons forge pig-iron. The furnaces in blast at the end of April numbered 112, compared with 107 at the end of March and an average of 284 in 1920. The production of steel ingots and castings dropped in April to 404,200 tons from 549,400 tons in March.

MR. E. POVEY, sales manager for Bamfords, Limited, agricultural engineers and ironfounders, of Leighton Ironworks, Uttoxeter, died recently in his 65th year. The deceased gentleman had been in the service of Bamfords, Limited, for nearly half a century.

Making of a Solution Pan in Loam.

By Arthur Greenhalgh.

On reference to Fig. 1, which shows the finished casting, it will be seen that it is necessary to make the job in three parts. Four plates being required, one being shaped to take the brackets and outlet pipe (A and B, Fig. 1). The spindle seating can be fastened to the bottom plate, as at A, Fig. 2. The plate having been placed on three or four stands the spindle is placed in position. A layer of bricks is bedded in loam on the bottom, the space between the bricks being filled with small ashes. A level bed is strickled off now, about 18 in. in dia. for the bottom of the flange (C, Fig. 1). This neck and flange is formed by means of a core. The strickle-board is placed in position as shown at A, Fig. 3—Fig. 3, C, showing the core forming the neck and flange.



The outlet pipe, B, Fig. 1, is now set, level with the bottom of the pan, the small lips at the end of the pipe being loose, to be drawn in afterwards. The top side of the pipe being lifted with the middle part. Wood is fastened on the board to make the joint and to form the bed for the side brackets. The job is now bricked up to this temporary strickle, care being taken to keep the bricks away from the side of the pipe, as there is a small drop joint. Fig. 4 shows the first joint with side brackets in position. After the joint has "stiffened," parting sand is put on and the shaped plate bedded on soft loam. The whole is then bricked up to the top joint, a few bent irons or gaggers being required for the lift over the pipe and the corners of the brackets. Whilst the bottom part is "stiffening" the top plate can be placed on another set of stands, the spindle seating in this case being underneath the plate set on three weights and wedged to the plate to prevent it moving when being worked. The strickle board is now placed in position, and a single row of bricks is built up until the commencement of the dome is reached. A plate with prongs on one side and three staples on the other is now bedded on the top of the bricks, the staples going down the cylindrical brick wall, to be fastened by bolt hooks and fish plates to the top plate as in Fig. 5. The space between the prongs being filled in with brick and loam. After both parts have been "roughed up," they are "slipped up"; that is, finished off with soft loam which has been put through a sieve. The top part can now be put in the stove to dry. After the bottom has "stiffened" the middle part is lifted away, the brackets drawn out and any broken parts made good; the same being done with the outlet pipe, the back of the print being cut away.

The spindle is lifted out and the hole plugged with waste, afterwards filled with loam, making the bottom of the flange level. The two parts are then put in the stove to dry. After being dried, the mould is dressed with sandpaper and blacked whilst hot. The bottom part is then placed on a soft, level bed, and the middle part tried on, the joint being made up with oil and blacking. The core for the outlet pipe is now tried in, after it has been made to fit the bend in the top part, where it will cut through. A stud holding this core up, the top part touching it, will hold it in position. It is better to have this core well back in the print, until the top is on, it can then be pushed up afterwards. The top, having been turned over, is tried on. The runner and riser is made up; it is run on the top. Bolts are used to fasten the job together, reaching from top to bottom plate. Fig. 6 shows the job ready for casting.

Tests of Centrifugally Cast Steel.*

Six steel cylinder castings, manufactured by the Millspaugh centrifugal process, were examined for hardness, tensile strength, impact resistance, density, internal stress, segregation, soundness, and microstructure, as cast and after various heat-treatments. The compositions of the cylinders ranged from two low-carbon steels (0.17 and 0.23 per cent. C.) to three nickel steels ranging in carbon from 0.33, 0.46, to 0.66 per cent. and in nickel from 2.69, 2.35, to 2.92 per cent. Segregations of carbon, phosphorus, sulphur, nickel and copper appear to exist to a slight extent, but only radially, and are most marked next the inner surface in a narrow zone about 1-16 in. deep. The hardness practically follows the segregation, and there was little evidence of unsoundness. The density across a section is practically constant. The mechanical properties show generally somewhat greater strength, elastic limit, and resistance to shock, but less ductility, in the tangential than in the longitudinal direction. The internal stresses developed in the castings show values of the order of the elastic limit, the outer zones of the castings being in compression. The investigations demonstrated that castings produced by this method, suitably heat-treated, may rival forgings of similar chemical composition.—G. K. Burgess (U.S. Bur. Stds. Tech., P, No. 192, 20 pp.).

Norwegian Iron Industry.—The Norwegian Industrial Arbitration Court last week published their decision as to wages and working conditions in the iron industry. The findings include a reduction in the wages of skilled workers of 55 öre (about 7d. at par) per hour and an eight-day holiday. The new provisions will be in force for one year, but alterations may be made at the expiry of six months if the cost of living materially changes.

* Institution of Civil Engineers (Abstract).

The Beardsley-Piper Sand-Slinger Moulding Machine.

On an average half of the labour of moulding lies in the ramming of the box. There are gravity sand-rammers, hand squeezers, pneumatic squeezers, roller rammers and jarring machines, all designed for this purpose, but whilst these are fairly effective their intricate mechanism sometimes gets out of order. Moreover, only plates of a fixed size can be used, and it often happens that certain patterns are just too large, requiring a larger machine, or too small, requiring needlessly large boxes. However, all these machines have their spheres of usefulness, especially in repetition work. At the same time, there are distinct advantages in a machine that will fill boxes of any size and ensure the sand completely filling every inaccessible corner.

Messrs. the Foundry Plant & Machinery, Limited, 28, Royal Exchange Square, Glasgow, claim to have met the case by the introduction of the Beardsley-Piper sand-slinger moulding machine, which not only eliminates the use of shovel and rammer by the moulder, but does the work by throwing handfuls of sand at the rate of 1,500 a minute. This machine can ram a large box as effectively as a small one. Moreover, it does not require deep and expensive pits and heavy foundations. It is mobile, requires practically no fixing, fills the box and rams the sand, and leaves both box and pattern at rest.

The machines are made in various forms, one being of the tractor type, which may be moved to different parts of the foundry, whilst another is a stationary machine, which works within a radius of 9 ft. As will be seen from the accompanying illustration (Fig. 1), the tractor-type machine travels into the sand heap under its own power, collecting the sand from the floor by means of a right and left hand sand-cutting screw-conveyor, which conveys the sand to the centre of the machine, where it is elevated by means of a bucket elevator and deposited on to the screen of an oscillating riddle. This riddle is so constructed that scrap, gaggers, cores, etc., which are in the sand, will stay on top of the screen and work to the front end, where they are deposited into a shute and then into the scrap box which is mounted on the main arm.

The riddled sand is conveyed by the oscillating riddle into a hopper mounted on the impeller arm, above a belt that conveys the sand into the impelling head, which discharges the sand with centrifugal force into the mould at the rate of 10 cubic ft. of rammed sand per minute. The ramming capacity of this machine can be regulated by the speed at which it is fed into the sand heap. The standard tractor will work into a sand heap that is 9 ft. wide, and the working radius of the arm also is 9 ft., within which it will ram any flask or flasks 34 in. high.

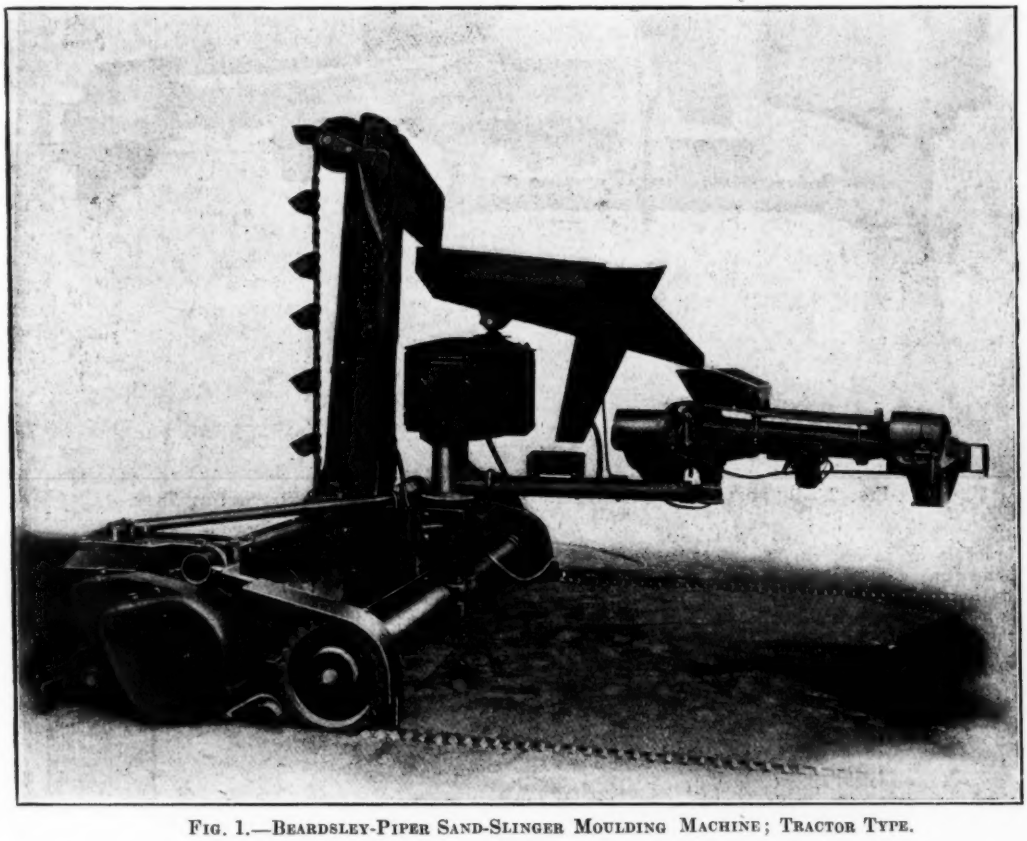


Fig. 1.—Beardsley-Piper Sand-Slinger Moulding Machine; Tractor Type.

The desired density of the sand in any part of the mould is controlled by the speed of the paddle in the impelling or ramming head and the operation of ramming head over mould. For instance, if it is desired to ram hard or very dense, the head is moved faster over that part of the mould. If it is desired soft or less dense, the head is moved slower over that part of the mould. It is customary to have a drag pattern on one side of the centre line of the machine and a cope pattern on the opposite side. In this way the drag is rammed, and as it is being removed the cope is being rammed, and while the drag is being rammed the cope is removed, and so on. Drag and cope patterns are usually mounted on trucks, and move with the machine proper. No additional ramming is required. A labourer can be taught to operate the machine in a few hours, as its operation is very simple.

The stationary machine has the same ramming capacity as the tractor type, and is adapted for use in foundries having a sand-conveying system or where auxiliary equipment is installed to supply sand to the machine. This type of machine works to great advantage in conjunction with a turn-

table, or mould-conveying systems, or where two floors are to be served for continuous pouring. One method by which maximum production may be secured from a stationary type sand-slinger is one involving the employment of four independent

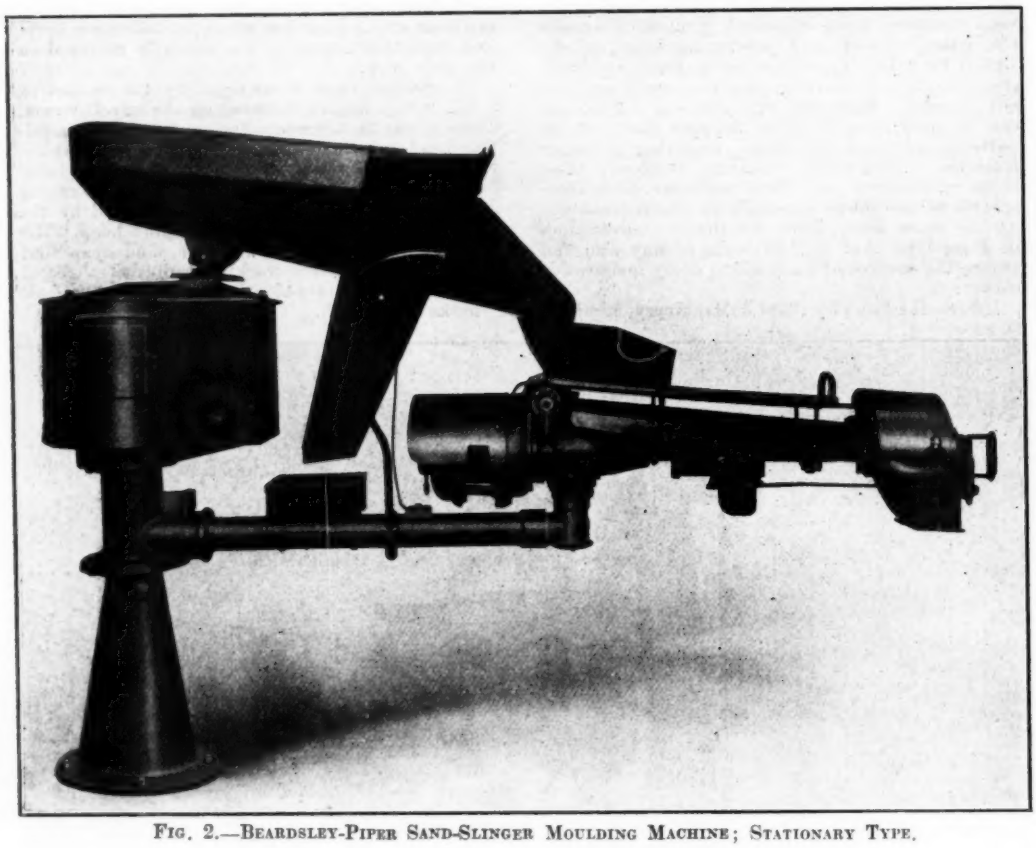


Fig. 2.—Beardsley-Piper Sand-Slinger Moulding Machine; Stationary Type.

brackets or tables, capable of being revolved by hand on a central pivot or axis set round a stationary machine. At each end of each bracket is a stripping-plate pattern frame; at the one end the drag and at the other the cope. A drag is rammed up and the bracket is revolved to admit of the cope part being rammed. While these moulds are being carried away and closed, the man at the next bracket is busy ramming his boxes, and so on round the four. The machine is never idle, and the production exceeds everything previously accomplished by any other type of moulding machine.

A reference is necessary in regard to the impeller head, which is the vital part of the sand-slinger machine. It does not merely throw sand at a high velocity, but forms it into wads or compressed handfuls preparatory to projecting it into the moulding box. A single blade is fitted to the impeller head, and is clearly seen in our illustration of this portion of the machine. The blade is

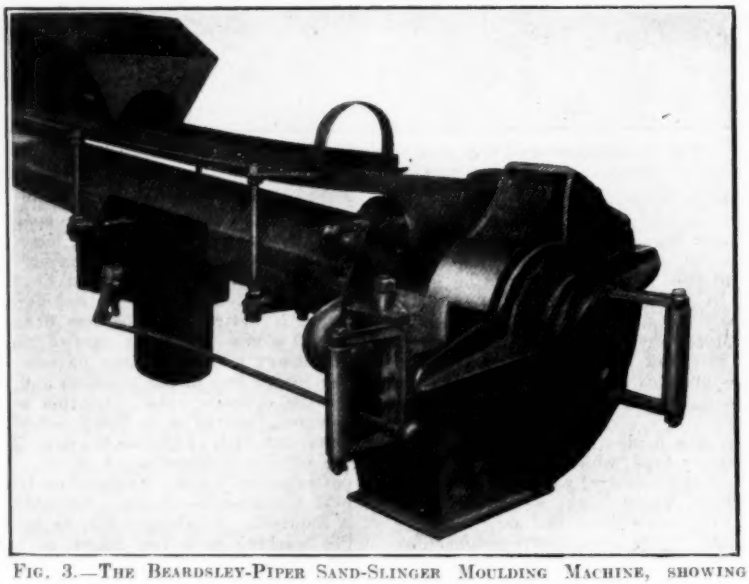


Fig. 3.—The Beardsley-Piper Sand-Slinger Moulding Machine, showing Details of the Impeller Head.

the only part of the sand-slinger liable to wear out quickly. A very simple iron casting, costing only a few pence and replaceable in two minutes, has therefore been designed to insure cheap and convenient replacement. This can be made in the foundry and a small stock kept handy for replacement.

The machine is electrically operated, and the electrical equipment is thoroughly efficient and virtually fool-proof, whilst ball bearings are employed throughout. For tractor type machines three motors are required, totalling about 15 b.h.p. For stationary machines two motors, totalling about 7 b.h.p., are necessary.

Improvements in Pneumatic Scaling Tools.

Our illustrations show an important improvement which has recently been introduced into the design of the pneumatic scaling tools manufactured by Mr. Frank Gilman, Wilders Drive, Warwick Road, Birmingham.

The tools are constructed with one or more cylinders, according to the particular duty for

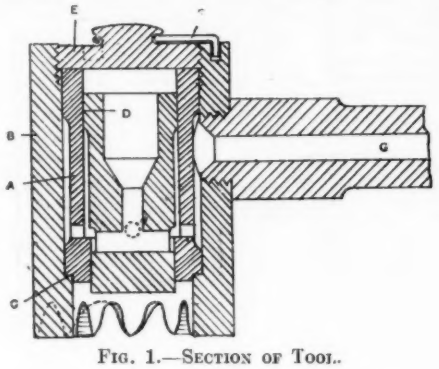


FIG. 1.—SECTION OF TOOL.

which they are designed. Hitherto the bush forming the cylinder has been made to screw into, or out of, the body member from that end of the bush through which protrudes the piston shank forming the hammer, the body being made solid at its opposite end. Although this form of construction worked very well, considerable trouble

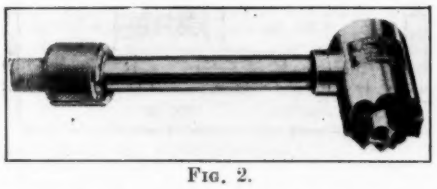


FIG. 2.

was experienced with the bushes becoming loose owing to the vibration. With the form of construction now adopted, however, this trouble has been eliminated.

The construction will be understood on reference to our sectional illustration (Fig. 1), only so much of the tool being shown as is necessary to indicate the improvement. The bush A is made somewhat shorter than the body member B; this last, it will be seen, being bored right through and threaded at its upper end. The bush at either end is of slightly larger diameter than the central portion, and these ends form the bearing surfaces in the body member, the bush bearing against a shoulder C, formed in the body adjacent to the opening through which the piston shank D protrudes. The bush introduced into the body from the top end is retained in position by the plug E, which, in its turn, is retained in position by a locking wire F, which is formed in the shape of a U so as to embrace the neck part formed on the plug, whilst the cranked ends engage in holes formed in the plug and the body member respectively, so that the spring of the wire tends to turn the plug in the direction to screw it up. The annular space between the bush and the body receives the live air through the hole G, formed in the handle of the tool, passing through the holes which are drilled in the bush at the bottom of the cavity to operate the hammer in the interior of the bush.

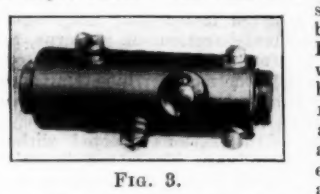


FIG. 3.

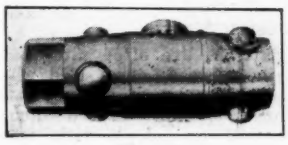


FIG. 4.

FIG. 5.

As already stated, the tools are made in a variety of different patterns in accordance with the particular purpose for which they are required. The tool illustrated in Fig. 2 is designed for scaling Lancashire, marine, Cornish, locomotive, vertical and other boilers, as also for cleaning the drums of tubular boilers. This tool requires about 16 cub. ft. of air per minute, at a pressure of 60 to 80 lbs. per sq. in., and, according to the pressure of air available, delivers from 8,000 to 10,000 blows per min. For removal of scale from water-tube boilers the tool illustrated in Fig. 3 is employed, this has three pistons set at an angle of 120 deg. The most recent development is the tool shown in Fig. 4, designed for removing scale from the outside of fire tubes. It has a double-acting vibrator and delivers from 10,000 to 12,000 blows per min., incidentally setting up an intense vibration and so causing the scale to fall away.

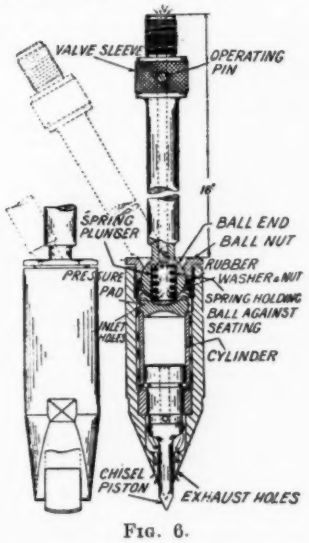


FIG. 6.

The tool shown in Fig. 5 is designed for removing scale from bent or curved tubes. It follows somewhat on the lines of Fig. 3, but has all the three pistons on the same plane. It is fitted with a ball joint and arranged for connecting to a flexible hose.

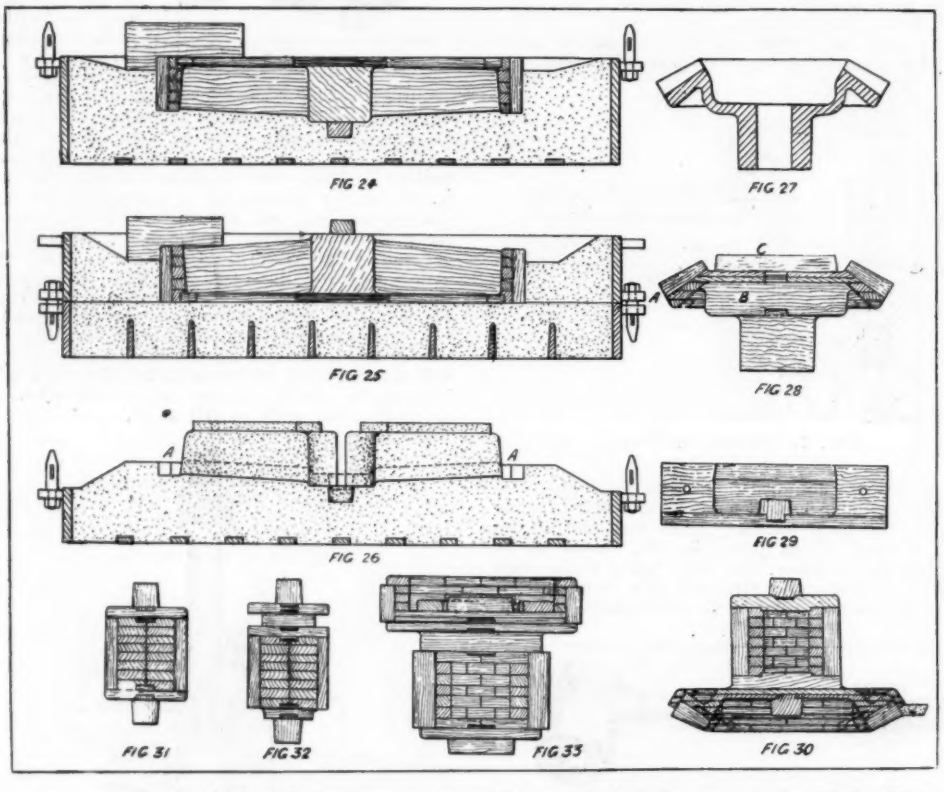
A tool designed for the removal of extra thick encrustations is illustrated in Fig. 6. This, in point of fact, is a recent development of the tool shown in Fig. 1. The air, operated by a valve, passes through a ball end, through the inlet holes in the spring plunger, thence through holes in a pressure pad, and so down sides of the cylinder to operate the chisel. The exhaust air in this instance is directed on to the scale which has been removed by the chisel, thus blowing the small particles of scale away and leaving a clear view for the operator.

D

How Patterns are Altered.—II.*

By Joseph Horner.

Core boxes and patterns are often altered by the addition of strips of wood, or of lead when the amount is small. The latter is only used when the additions do not exceed about $\frac{1}{8}$ in. The best method to adopt with wood is to cut it to the shape and dimensions required, and screw it into the box. Another way, suitable if the thickness is only moderate, is to plane a strip to the thickness wanted, cut it off to the length, and steam it, or soak it in hot water, bend it to the curve and screw it in. Later, if it has to be removed to put the box back into its original form, the wood will retain its curvature nearly, and can be stored. Sometimes, if the radius is large, a piece of wood is prepared with the longitudinal grain running with the axis of the cylindrical box, and bent after making a number of saw-kerfs along it. This produces a number of minute flats, and if the piece is removed at a future time it is almost certain to break.



Or strips may be attached with interspaces to be filled with sand. This is only suitable for the larger boxes.

When alterations involve only a slight additional thickness, lead is bent round, and nailed or screwed, the latter preferably. The utility of lead lies in the fact that it just suffices for a boring or turning allowance. It is therefore often put into core boxes, and around core prints, and around worn castings to be used for patterns, such as bushes, half brasses, etc.

Gear-wheel patterns, being expensive, are frequently altered in jobbing shops. The choice of methods is governed by the numbers of similar castings required. If only two or three castings are wanted, depth of face can be increased by "drawing" the pattern. But for a considerable number a new pattern should be made. Sometimes the depth of a pattern is increased by a supplementary fitting, which is objectionable, because the sand is liable to become torn up in delivery. If the addition amounts to much the arms also should be deepened.

A pattern is drawn by ramming it up in the usual way, and then withdrawing it from the mould to the extent only of the extra thickness required, then completing the ramming to the top ends of the teeth, and finally withdrawing the pattern. This is easily done with pinions that entail no extra work. But when wheels have arms it involves re-ramming all the flat arms, for otherwise they would be as much thicker as the extra thickness of the tooth face. When teeth are stopped off, the wheel is rammed as before, but a strickle worked from the top face, and all around and between the teeth makes a new sand joint at the reduced depth of face, Fig. 24, on which joint the top box-part is rammed. But in this case, where arms are involved, the thickness of the flat arms is partly, or entirely obliterated by the lowering of the joint. A pattern arm, from which the new arm moulds are made good, entails much work on the moulder, with results that may not be satisfactory. A better method is to strickle from the other face of the wheel, Fig. 25, thus retaining the flat arms intact. Then only the vertical arms have to be reduced in depth with a stopping off piece, which is not very troublesome. Fig. 26 shows the cope turned over after it has been rammed on the new joint. The space at A has now to be filled with sand, and the vertical arms and boss to be stopped off to the dotted lines shown.

Given a plain rectangular frame such as would do duty for many crane beds and centres, this can be easily lengthened, widened, or stopped off, and the interior of the casting be formed to any shape with boss, ribs, etc., by means of cores alone. If such a pattern were framed to deliver its own interior, no material alterations could be effected.

Risk of error is often lessened by marking-out cored outlines, and metal sections on patterns, and cross hatching the metal deeply. This not only affords valuable aid to the moulder in setting cores, but also remains a permanent record of work done in the past.

Some examples of alterations effected without cutting or stopping off are illustrated in subsequent figures. Fig. 27 is a section through a bevel wheel casting, not having the usual form of centre, but being deeply recessed on the front face to permit a friction clutch to clear it there. The standard pattern is seen at A, Fig. 28, having a central disc, with a stud-hole for bosses, prints or other fittings. To make a casting from it as shown in Fig. 27, a block, B, and a boss are

* Part 1 appeared in our issue of April 20.

made for the back, Fig. 28, and a print, C, at the front. A core box, Fig. 29, takes out the interior, and includes a core print for the shaft hole. The core box is bored in the lathe.

Fig. 30 shows the provision for casting a standard bevel-wheel, with half shrouds or caps—that is, extending to the pitch circles, to a standard pinion with full shrouding—to the points of the teeth. The pinion is set at a definite distance from the wheel with a thickness piece intervening, which also shrouds it on that side. The pinion is hollow, being built up with sector pieces instead of with segments extending to the centre. The wheel is recessed in front because it goes on a shaft that carries a friction clutch adjacent. Its half shrouds are both left loose. The narrow undercut zone between the rolling edge of the outer shroud and the teeth is taken out with a ring core rammed on a circular grid around the pattern, not in a separate box. This core is outlined at the right hand.

Figs. 31 to 33 show some of the possibilities of alterations with pinions. Fig. 31 is the usual standard pinion, with segments running to the centre, and full shrouded on both sides, the shrouds being fitted with a standard central stud, never with dowells. Half-shrouds can be substituted, or bosses, or a clutch and boss, as in Fig. 32. Fig. 33 shows two large pinions both half-shrouded, one half shroud forming a distance piece. The larger pinion has a claw clutch in its interior, which can be removed and other clutch jaws substituted. The registered joints in all these examples are made with central studs to permit of the interchange of all fittings.

An important aspect of alterations is that which concerns reversals of single patterns, right- and left-handed. The matter may be exemplified by

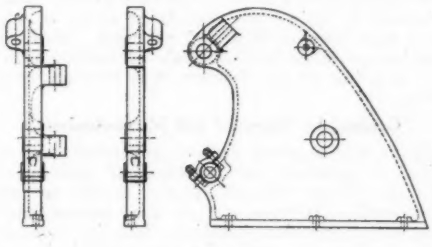


FIG. 34.

the cheek casting shown in Fig. 34, which is typical of much work of this class. It will be observed that the castings shown are exactly right and left, with the exception of the lugs. Reversal of the pattern must therefore be effected by removing the ribbings from one side of the web and screwing them on the other side. This involves making the two-shaft bearings new, since they will not reverse. The curved ribs are cut in short lengths to favour their reversal, the break being where the curve changes.

The adoption of this method depends wholly on the number of castings required. If one pair, or only a few pairs are wanted, then reversal is a legitimate solution, but not otherwise. No standard pattern, even though of large dimensions, should be treated in this way. The pattern is greatly weakened, and inaccuracies creep in. Fillets cannot be conveniently inserted. The web or plate is a weak portion. In this case it must be made either with open joints, with a batten or two to stiffen it about the central parts, or it must be made as an open frame—the better way—leaving the interior to be strickled, or to be filled in with loose boards. The reversal of the smaller patterns, except for a very few castings, is not to be recommended.

The problem of pattern alterations is therefore seen to be one that calls for careful judgment. If effected with no regard to consequences the foreman is storing up trouble. Apart from the risks of omissions when a pattern has to be put back to its original shape, often done in haste, the alterations inflict damage often to such an extent that the modifications would have paid for a new pattern. To lessen risks, patterns should be treated in a systematic manner and some permanent record should be made of alterations.

Schoop's Metal Spray Process.

A writer in the *Far Eastern Review* gives some details of the spraying process invented by Mr. R. Schoop, of Zurich.

The apparatus consists of a vessel containing the metallic, powder, of which the lower part can be closed by an ingeniously constructed valve with an irregular seating surface. Compressed gas, after being heated in a special heating device, is passed through the pipe into the upper part of the apparatus in order to force the powder out under pressure; the greater part of the gas from the same source, after having a rotary motion imparted to it, acts on the powder expelled from the vessel and hurls it with great force through a nozzle and a metal tube on to the object to be coated.

The microscopical sections made show how closely the sprayed metal adheres to the surface on to which it is projected, and how it eats and fills up its smallest pores.

This coating is always equally dense and homogeneous and can be made adherent or removable according to the preliminary treatment of the surface to be coated. The list which is given here of the uses for which the spraying process has already been employed, or in which it may possibly be used, cannot in any way claim to be complete, but is only intended to provide examples of the commercial possibilities of the process.

The first possibility is the application of the spraying process for coating objects with lead or zinc or the plating of the interior of vessels, vats, etc., for use in the chemical industry, in mines and many other works. Any vessel of partially any material or any part of an apparatus, which is difficult to get at, can be protected against rust. The process is of particular advantage where angular irregular bodies are concerned, and especially in cases where it is desired to cover large surfaces of finished constructional parts as a protection against rust.

It is of interest to recall the trouble which has been taken to obtain successful protection against rust in the cases of high structures which are exposed to the action of the weather, such as iron bridges, and the fact that of late years many bridges have been built of armoured concrete largely owing to the enormous expenditure which the constant renewal of the paint of the iron bridges necessitated. If the finished parts of structural iron work are properly sprayed, there should be no further expense beyond the one initial outlay for a considerable time. There is ample opportunity of observing on many railways how very much such structures suffer under the action of the weather, in spite of the most careful painting. Again, in many railway stations, the iron structures are greatly damaged by smoke. The value of spraying process in this direction can be recognised at once. Before leaving the consideration of the heavier engineering branches one branch of technical industry must be mentioned which has always stood alone, for whilst in modern times processes and machines are daily invented for the purpose of facilitating and accelerating manufacture, and thus increasing the power of production, we find that in the electro-deposition of metals the laws of nature themselves place insurmountable obstacles, and the importance which the spraying process has in this connection is obvious.

Metallic surfaces only need cleaning with a sand blast before spraying, and objects which do not conduct electricity do not require to be first rendered conductive, since the sprayed coating can be produced on any material. In addition to this, the process offers the great advantage that it permits aluminium to be used, the one metal which the art of electric deposition has up till now been unable to utilise.

Packing cases, etc., can easily be strengthened by spraying the edges of the boxes for oversea transport. The task of soldering up a box containing dynamite must be a very unpleasant one, but it can be effected without danger by spraying process.

After what has been said it is unnecessary to reiterate the advantages which the applications of the spraying process offer in connection with artistic industrial works; for instance, coating wood, plaster, leather or celluloid objects wholly or partially with metal, or for producing patterns on surfaces by means of stencils.

XUM

Science and the Foundry.

Dr. Desch, Dean of the Faculty of Metallurgy at the Sheffield University, at a meeting of Sheffield foundrymen on the occasion of the conclusion of a series of lectures to Sheffield foundrymen which have been given during the winter by such well-known metallurgists as Drs. Desch, Hatfield, and Percy Longmuir, said that now the series of lectures had been concluded, he would like to deal with the relation of the Universities of the country to their particular branch of industry. It had been the aim of the Sheffield University in the lectures which had just been concluded to make the information that had been conveyed to them as practical as possible, and for that reason the lectures had been given by gentlemen who had great practical experience in foundry work and were able to speak with insight and knowledge of the industry.

Foundry Scientifically Neglected.

In view of the tremendous importance of the foundry to the engineer it was remarkable how little scientific attention had been given to it. The engineering industry could not exist without the foundry because very nearly all the metal that was used had passed through a molten condition at some time or other and at some stage been cast. And although a great deal of metals passed through other processes, still their character depended to a very large extent on the treatment they received at the very first stage of the work. So that the importance of the foundry was fundamental to the engineer. And yet if compared, the difference between scientific work done on foundry problems and the heat treatment of steel or forgings and non-ferrous alloys, the proportion was extraordinary.

That he thought was a rather unfortunate state of things, and the result was that the foundry, in too many instances, was the most backward part of the engineering establishment, because the methods used were often patchwork and the rule-of-thumb had a far greater part in it than in any other branch of engineering.

There had been no intention of teaching foundry work at the University. That could only be learned in the foundry. But what had been attempted was to show something of the bearing of science on the principles underlying foundry work. The actual practice and work could only be learned in the foundry and nowhere else. But what they had attempted to show was why certain things happened; why castings behaved in a certain way; why difficulties occurred, and how measures could be taken to overcome those difficulties.

Foundry Status Needs Improving.

Unfortunately, over a good deal of the country there was a feeling in the engineering industry that moulding was work of an inferior class and sometimes it was looked upon as less important than other branches of engineering. That was to be regretted, for not only was moulding immensely important, but it was also immensely interesting. If proper provision could be made for a better training in the principles of foundry work, it might be possible to bring about a better general opinion of the foundry branch of industry. What was wanted was the raising of the status of the industry and those engaged in it and bring it and them up to the level of other branches of metallurgical practice.

Sheffield was peculiarly situated in that respect, because it was mostly engaged in steel foundry work, and, as they knew, wherever steel was handled science was applied. The iron foundry had not received anything like the same attention, and yet there were interesting questions with which the iron foundry was concerned.

They all knew that the manufacture of steel within the last half century or 70 years had advanced by leaps and bounds and very largely through the application of science. It had been elaborated by the Bessemer, the Siemens, and in recent years by the electric furnace, and it had now developed to such a pitch that it became impossible to work any longer by the acquired skill of the workman. Scientific control was necessary, and the manufacture of steel had become one of the most highly skilled of all the industries. It had been improved since the introduction of the Bessemer process, and that improvement had been made possible by the practical steel worker and the scientific man working hand in hand.

Something of the same attention might be given to iron. It was very remarkable how little they knew about cast iron as compared with steel. There was a good deal of information about iron, but it was loose and disjointed as compared with what was known about steel, and one had only to look at a list of foundry problems to see what fields there were for research in connection with the foundry.

Grading by Fracture now More Difficult.

Indicating a few of the problems that might be touched upon with reference to iron, Dr. Desch mentioned the question of grading. When iron had to be graded for foundry purposes it used to be sufficient to simply examine the fracture of the pigs and knowing the name of the brands of the different pigs. A pig iron from a certain maker bearing a certain number was taken year after year and mixed with other brands, the quality of which was also known, fairly uniform mixing could be obtained and accidental variations more or less avoided. But that had all been upset by the war, because ironmasters had to change over to quite different ores and they had to make quite different mixings of iron. They had to obtain ores from Spain, Lincoln, and Northumberland, and the result was one got iron of all kinds of compositions coming on the market during the period of the war. Original conditions had not been restored, and it would be very unsafe making mixtures by using the brands of seven or eight years ago, because they had changed. There had also been evolved new methods of casting pigs so that grading by the fracture was now an unsafe thing.

Grading by Chemical and Micro-Analysis.

There was a great deal of controversy on the point of grading by fracture or grading by analysis. They were told it was unsafe to grade by analysis. He was not at that moment going into the particular question, but he suggested that if they got not only the analysis but the micro-structure they would be able to get the whole properties of the iron on re-melting. He thought they might use the microscope in showing the changing quality of the pig iron just as showing it in the case of steel. The quality of steel could not be ascertained by analysis alone, but a combination of the analysis and an examination of the micro-structure showed the properties at once in steel. That he ventured to think was what was going to happen in the case of cast iron. A combination of the analysis and an examination by the microscope would indicate what the pig iron was and what its properties would be. Then there was the question of testing of cast iron, which he thought would be placed on a better basis before very long. Another question was the fluidity of the metals. It was very remarkable how little information had been collected on the factors that influenced the fluidity of metal. Every foundryman knew intimately how the metal would vary in fluidity under comparatively small variations. He knew that by experience, but he did not know what was the cause. That was another field for research.

Alloyed Cast Iron.

As they knew, there had been a revolution in the steel industry by introducing other metals into the steel. Very little had been done in that direction in iron. For some time alloy cast irons had been used, but there were not very many, and their use was comparatively small. That needed experimenting, because it was quite possible by alloys that one could get cast irons of immensely superior quality than at present.

Heat Treatment of Castings.

Another question was the heat treatment of castings. That had not been very much studied yet, but the improvement on other classes of metals was

so wonderful that it did seem certainly worth while making experiments on the heat treatment of castings. A proper casting might be made equally as good as forging. An example of work of that kind was to be found in those firms which during the war had made such things as hand grenades, fuse bodies, etc. These firms had tackled that with great success and, as they were aware, cast iron was made towards the end of the war immensely superior in quality largely as a result of systematic experiments. So the demands that had crept in of late years for iron that would stand high temperatures without suffering badly had opened up a remarkable field. The invention of the Diesel engine calling for a metal which would keep up its mechanical properties and stand wear approaching red-heat had called for immense amount of work. It should be possible also to get finer irons than was used for these cylinders.

The Sand Problem.

Another problem was that of sand. So far as iron founding went the question of sands did not present any very great difficulty. There were many good sands, but the question was not by any means so simple in the steel foundry. There was still a lot of work on the conditions that were required in sands for really first-class steel castings. Then there was the question of non-ferrous alloys and sands. Although the temperatures were not so high, yet sands there presented peculiar difficulties which presented another field of possible research where the expert on sands—the geologist—could work along with the metallurgist and the practical foundryman.

Temperature Measurement.

The measurement of temperatures was another question of importance. For a good many practical purposes the foundryman could judge the temperature by the eye. A skilled man accustomed to his work could judge the temperature with sufficient accuracy by the eye. But when he came to using a metal of different composition or making a casting requiring greater fluidity it was not by any means so easy to control the temperature that is wanted by the eye. They wanted to know something more about temperatures instead of merely guessing. It was safe to say that before very long foundries would be measuring their temperatures by means of the pyrometer and pyrometry, which had so far been of little importance to the foundry, would eventually become one of the important things and one of ordinary workshop routine.

Co-operation Essential.

The success of the foundry really depended upon the close working together of the different persons carrying out the different processes, and it was therefore important for each to understand something of the work of the other. When a difficulty occurred in a foundry to-day he believed it was no uncommon thing for the moulder to blame the man who supplied the metal, and *vice versa*. That was due to the fact that neither of them knew very much about the other's work. And very often the patternmaker knows nothing about either. So that it was highly desirable for all those engaged in the foundry trade to understand one another's work, so that the patternmaker should understand the principles of the making of the cast and of the nature of the metal to be cast in the mould.

Foundry Education.

At present there were two associations dealing with foundry practice. One was the Institution of British Foundrymen, an association of experts who came together to exchange their views, and the other was the British Cast-Iron Research Association, which carried out systematic research for the foundries.

There had been some discussion as to the possibility of providing systematic training for the founding industry. Such training had long been in existence for all branches of engineering and for most branches of metallurgy. Universities and Technical Colleges had been organised in such a way to give systematic training to anyone engaged in engineering, steelmaking or other allied industries, but so far the foundry industry had been very strangely neglected. It was very rarely a scientifically-trained man went into the foundry at all, and there had been very little provision even for evening classes for those already engaged in the industry.

There were two questions which should be considered. One was the provision of instruction for men already engaged in the industry, and the second was the necessity of providing a class for instruction of apprentices. With regard to the first, there were in the foundries a number of men possessing a very high degree of technical skill acquired in the foundry in practical experience. There were cases, too, where these skilled men occasionally found their practical experience break down, and he had to overcome them as best he could. He often felt that he could get over these difficulties if he understood some of the principles underlying the behaviour of the metal on the introduction of silicon or phosphorus. A good many men in a foundry would be quite willing to take advantage of any provision made to enable them to understand these things.

The Apprentice Problem.

Then there was the problem of the apprentice. He believed in most towns it was the practice of boys to come straight from school and go to the foundry, and there to pick up practical information in the foundry in the usual way, which is usually unsystematic. In the case of engineering apprentices there is always an opportunity given for the boys to join evening classes and to learn not so much workshop practice, but to learn mechanics, drawing, arithmetic and geometry. The patternmakers had also been provided for in that respect. But little had been done for those concerned in moulding or those concerned with the mixing and melting of metal, and it might be well to consider whether it would be advisable to set up classes of that kind for the training of apprentices.

He desired to raise that whole question of the relation of the University to industry, and in doing so he did not want it to be understood that the University would not help. The metallurgists would welcome the establishment of such classes, because they had something to learn from the practical workmen, and were prepared to give an interchange of their information. The benefit would be a mutual one, and he could only say that, so far as the University of Sheffield was concerned, they were prepared to do their part.

After all, Universities such as Sheffield existed for the good and benefit of the citizens, and not for the benefit of training a limited number of highly-skilled scientific men, and it was an essential part of the work of the Sheffield University to co-operate with the industries of the town. One of those industries, and a highly important one, was the founding industry, and the object of the lectures which had just been concluded was to find out, among other things, how far the foundrymen generally were interested in the subject on which he had been addressing.

THE WAYNE ENGINEERING & EQUIPMENT COMPANY, LIMITED, have appointed the Efandem Company, Limited, 28, Queen Street, Albert Square, Manchester; Astbury & Madeley, Empire House, Great Charles Street, Birmingham; W. Anderson Penman, 36, Exchange Street, Norwich; C. F. French, Kent Works, Kendal; Douglas G. Cochrane & Company, Limited, Princes Buildings, 11, Akenside Hill, Newcastle-on-Tyne; and Philip & Bruce, Limited, 50, Wellington Street, Glasgow, as their agents.

WILLIAM JOHNSON & SONS (LEEDS), LIMITED, Leeds, have received an order from the Kailan Mining Administration, China, for a complete plant for the manufacture of fire bricks. At the present time the Kailan Mining Administration are using a grinding plant which was supplied by Messrs. William Johnson & Sons 20 years ago. The order now placed includes the whole of the machinery required for crushing and grinding the rock, quartz, etc., elevators, combined screens for grading the ground material into five sizes, automatic measuring, dry mixing and wet mixing apparatus, from which the materials will be transported to rotting chambers, and thence elevated to horizontal pug mixers and brick-making machines of specially heavy construction, fitted with renewable wearing parts throughout. There will be semi-automatic cutting tables for cutting the column into bricks or blocks as the case may be, and belt-driven machines for pressing the same.

XUM

Commutator Bushes.

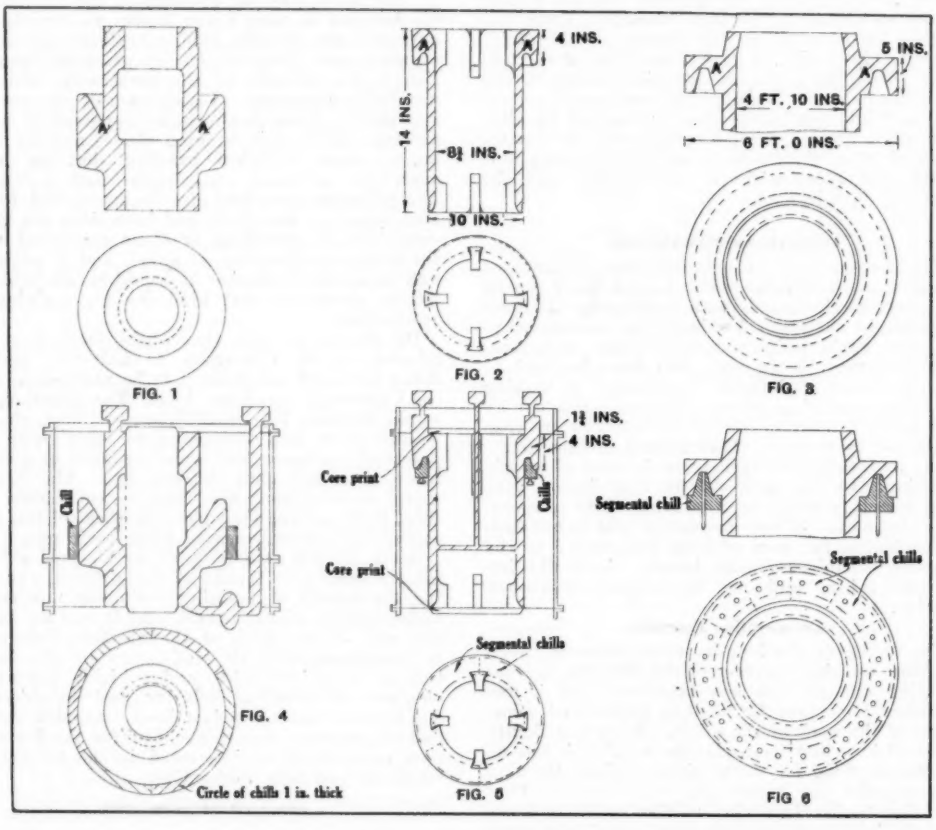
By S. G. Smith.

Commutator bushes closely resemble shaft couplings in importance, for there is the same necessity of clean, sound castings, requiring the same care and supervision in the production. In many cases the design is against the successful and satisfactory manufacture of these castings. When this cannot be altered, it is necessary for the foundry to find ways and means of overcoming the defects which naturally follow.

It is intended now only to refer to two or three commutator castings that require special consideration. These are shown in Figs. 1 to 3.

Experienced foundrymen looking at any of these would immediately scent trouble, providing he understands their function. Unless some precautionary measures are taken, the amount of defective work will be considerable.

The whole of the outside of these castings are machined, whilst the centre is bored—both having



usually uppermost when poured. The heavy part had, however, been tried cast down, but the drawn places in the heavy section were so bad that it was not repeated.

The method adopted is shown in Fig. 5. It will be noticed that a head 1¾ in. thick and 4 in. deep is carried around the top of the heavy section. Underneath the heavy section a circle of chills are placed, leaving only a minimum allowance for machining, also the castings were slightly fed by rods. A combination of the head above the heavy section, the chills underneath, and a little feeding resulted in sound castings.

It will be observed that the runner-gates pass down the middle of the centre core and branch off in two directions.

Two small dry-sand cores are rammed in the mould opposite the inlet runners to resist, or take the impinging of the molten iron during pouring, thus preserving a clean skin on the casting. These places are located on the pattern.

Twelve new patterns were made on the above design, differing only in length and diameter. The to be perfectly clean. If the slightest porosity develops when machining, they are at once scrapped.

From an inspection of Figs. 1 to 3 it will be obvious to the practical eye that in each case the trouble will be at A. With normal methods of moulding, there is nothing to prevent the thick section of iron marked A being free from porosity and draws. Unfortunately, those in the foundry have, if possible, to alter the natural laws of solidification of a fluid metal to the solid state.

With reference to Fig. 1, the means employed to prevent drawn places at A were as follows:— A row of chills placed around the thick section. Provision made for a feeder to pass through the chambered part of the centre core, and fed by rod. Swirl runner-gate and dross trap applied in order to obtain a clean casting. To ensure a clean thread at the top of the casting as poured, 1½ in. of head was allowed. Most of these points are shown in Fig. 4.

The type shown in Fig. 2 required different treatment, as the design is quite unlike Fig. 1. The heavy section in this figure, which is the part liable to exhibit drawn places when machined, is little experimenting done was well worth the time spent. Castings from Figs. 1 and 2 were made by semi-skilled moulders on the follow-board principle.

Fig. 3 represents part of a commutator casting, which is quite different from either of the two dealt with. This casting is 6 ft. in dia., and is swept up in loam. When the writer's attention was called to these castings several had been made, and were wasters, due to porosity in the heavy section. It may be interesting to state that the machining of a deep V-shape groove into this heavy section is absolutely necessary.

The means adopted to eliminate this defect were in one respect similar to that of Fig. 5.

This casting weighs about 20 cwt., consequently the chills (or denseners, as some prefer to designate them) were required to be fairly large and heavy. The circle of chills divided into segments, as shown in Fig. 6. Each chill-segment had two holes drilled in for rods to pass through into the mould in order that it should maintain its proper position when being poured. If either of these segments moved only slightly, the machining allowance, which was ¼ in., would probably disappear, leaving the "black witness" in some part of the

groove after machining, which would be fatal to the casting.

The chills in both the large and small commutators can be used many times. Very little protection in the way of coating is needed. In the small sand castings just a little graphitic carbon rubbed well on the surface exposed to the iron. In the large loam castings a thin covering of blacking wash should be applied, preferably from a mixture of thin oil and carbon blacking.

In all cases the surface of the chill exposed must be clean and free from small holes.

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

Mr. Samuelson's Presidential Address.

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—In his presidential address at the annual meeting of the Iron and Steel Institute, Mr. Francis Samuelson stated that "If and when the Kent Coalfield has further developed, a big steel industry may be established on either side of the Channel, based on an interchange of the ores of Normandy and Brittany, and perhaps also of the Eastern field of France, with the coal of Kent." I venture to submit that Mr. Samuelson has overlooked the potentialites of the Kent mineral field as a source of supply of *iron ore* as well as a coking coal.

Mr. E. O. Forster Brown, a member of the Iron and Steel Institute, in his evidence before the Coal Commission (Coal Industry Commission, volume 2, page 715-717), stated that he was acting in Kent as Consulting Engineer to Messrs. Dorman, Long and Company, Limited, Bolckow, Vaughan and Company, Limited, The Channel Steel Company, Limited, and Schneider et Cie., of Le Creusot, and estimated that 105 sq. miles (of the coalfield) contain an average of 23 ft. of coal of good average quality in seams of 3 ft. thick and upwards within a depth of 3,000 ft. from the surface, also "a deposit of iron ore, which, in conjunction with the development of the coal, it is considered can be converted into iron and steel successfully at competitive prices."

Further on he stated that "The Channel Steel Company has spent a large sum of money, through the companies of which it forms the fusion, in proving the existence and character of an important deposit of iron ore in the south-west of the field. To enable this iron ore to be turned into iron and steel, an adequate supply of fuel is necessary, and with this object in view Messrs. Dorman, Long & Company, Limited, who hold a large interest in the Channel Steel Company, have acquired an area of 4,700 acres of coal from the Bettes hanger Boring Company. This area has been proved by boreholes within and around it to contain approximately 140,000,000 tons of coal in workable seams of 3 ft. thick and over, within limits of 1,500 and 3,000 ft. from the surface. To recoup themselves for their expenditure, the Channel Steel Company will require to spend a sum of at least one and a half million pounds in blast furnaces and steel works, and a further sum of from one to one-and-a-half million pounds in developing the Betteshanger area, and providing the necessary coke ovens to supply the blast furnaces with fuel and the steel works with gas. The fact that it is proposed to put up plant to manufacture iron and steel in Kent will also create a demand for iron ores from abroad, and the economics in sea freight resulting from the carriage of coal worked by French interests in Kent to French ports and the return carriage of iron ore, as, for instance, from north-west France and Brittany, to iron and steel furnaces in Kent, is one of importance in looking at the development of this field from a national point of view."

The bed of ironstone which is found throughout the south-western section of the field was proved to be 22 to 26 in. thick in the neighbourhood of Martin Mill, where it was met at a depth of 365 yds. In this area it overlies about 55 feet of workable coal.

On analysis, the percentage of iron ore was found to be fairly constant, varying from 29.55 to 33.0 per cent. The phosphorus is somewhat variable, being as high as 0.72 per cent. at one particular part of the ore, and lower in others. On calculation, the material gave 43 per cent. iron (average); the sulphur content was found to be 0.063 per cent. This ore should be quite satisfactory for the manufacture of basic pig; it is practically self-fluxing, and with 43 per cent. of iron (calcined), is quite workable, and should give about a 2 per cent. phosphorus pig.

Recent tests by one of the foremost steel-making firms in Northern France have shown that the coal at present being worked in the Kent Collieries makes a good metallurgical coke.

To those of your readers who are interested in the subject, I would recommend the perusal of Chapter 6 of the British Coal Trade, by Mr. H. S. Jevons.—Yours, etc.,

ROBERT STANDEN, Lt.-Colonel.

15, Pall Mall East,
London, S.W.1.
May 9.

Life of Cupolas.

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—One of our cupolas in the works foundry was re-lined in August, 1920, and since that date a total weight of 1,520 tons of iron has been melted in it.

It would be interesting to know the "life" of an ordinary 9-in. brick-lined cupola of a well diameter of 40 in. It is still going strong, and shows no signs of burning through. We use ganister stone and a small quantity of fireclay for patching purposes.—Yours, etc.,

"SILICON."

"Pageant of Progress" in Chicago.

His Majesty's Consul-General at Chicago has informed the Department of Overseas Trade that the Mayor of Chicago and the Committee responsible for the organisation of the Chicago "Pageant of Progress," to be held from July 29 to August 14 next, have expressed the hope that British goods will be shown at the exhibition, which is held on the Municipal Pier. (The pier, the construction of which cost £1,000,000, runs for a thousand yards out into Lake Michigan.)

A similar exhibition last year was remarkably successful. As was then pointed out, British firms might benefit greatly by exhibiting at Chicago, which is the buying and distributing centre for an enormous area in the Middle West. The exhibition is to be divided into 16 trade sections, including automobiles, building, household furnishing and equipment, electrical industries, etc. British firms will be charged the same rates for space as Chicago firms, viz., $500 for an enclosed floor space of 20 ft. × 10 ft., including lighting and heating.

Applications for space should be addressed to the Organising Secretary, "Pageant of Progress," 507, City Hall, Chicago, U.S.A.

Selective Corrosion and Dezincification of Brass.*

The author discusses the behaviour of brass tubes, with special reference to the case of condensers using sea-water. Corrosion occurs in different condensers under similar conditions at greatly differing rates, and in a manner difficult to explain by the chemical reactions of slight acidity or alkalinity. He develops the theory that the pitting is largely of an electrolytic origin, and that its intensity depends to a considerable extent upon the electrical situation of the tube attacked. In support of this theory, it is claimed that voltage-differences of a minute degree have been registered as between the tubes and some other part of the condenser; that electrically-insulated tubes are more immune than those giving good contact with the tube-plate; and that pure copper tubes have been found to corrode where brass tubes had previously been attacked. Protective measures are indicated.—F. DE WURSTEMBERGER. (*Rev. Mét.* 18, *689-712.*)

* Institute of Civil Engineers Abstract.

XUM

Institution of British Foundrymen.

LONDON BRANCH.

ANNUAL GENERAL MEETING.

At the annual general meeting of the London Branch, held at the Institute of Marine Engineers, April 13, the Branch-President, Mr. H. O. Slater, in the chair.

The minutes of the last annual general meeting having been read, confirmed and signed, the Secretary (Mr. V. C. Faulkner) read his report of the progress of the Branch during the year. At the last general meeting, held in August, 1921, at the Cannon Street Hotel, London, a small but enthusiastic audience of about a dozen had met to receive one of the most dismal reports ever presented to a technical society. The Branch had borrowed £25, and a requisition was in for another £15, whilst there was just enough money to pay for a bill owing, and the closing down of the Branch was being discussed by the parent body. The members decided to form an entirely new Council from those present, and he believed they could congratulate themselves on having made considerable progress. There would be a balance of some £6 when the present session closed. This satisfactory state of affairs had only been brought about by practising the most rigid economy, but that had not prevented the Council from spending small sums on propaganda work, which had taken the form of organising the visit of London foundry employees to the Foundry Exhibition to be held in Birmingham in June.

The list of members, as published in the Proceedings, showed that the Branch had 77 members, 61 Associate Members, and 3 Associates, a total of 141. As far as could be ascertained, these figures were wrong, and should have read 68 members, 55 Associate Members and 2 Associates, a total of 125. The present figures were 1 subscribing firm, 80 members, 67 Associate Members, and 5 Associates, a total of 153. This year, taking transferred members as being new, they had gained some 35 members, whilst they had only really lost 3; 1 from death (Mr. Mather) and 2 resignations (Mr. Robertson and Mr. Gow). All the rest stated that they had resigned some years ago. The real increase, therefore, had been 34, or 27 per cent.

During the session, 8 papers would have been presented, 5 excursions, and a dinner organised. The one distressing factor was the extremely poor attendance at the meetings, to which factor Mr. Faulkner attributed to the state of trade.

He could not close his report without stating that the improved condition of the Branch was due to its President and its untiring Committee. During the year they had held some 8 or 9 Council meetings, which were well attended. The delegates elected to represent the Branch at the General Council meetings had always turned up. There were always at least 3 at every General Council meeting held.

Finally, Mr. Faulkner requested everybody present to indicate exactly on what subjects they would like lectures during the next session. If they could suggest subjects, the Branch Council might be able to find a suitable lecturer, although that could not be definitely promised. It would be found, perhaps, that amongst the members there was some stability of ideas, and a more interesting programme could be arranged. However, he could not promise for the next session a more interesting programme than they had had in 1921-22.

On the motion of Mr. J. Longden, seconded by Mr. A. R. Bartlett, the Secretary's report was unanimously adopted.

Election of Officers.

The Branch-President said there seemed to be a certain amount of diffidence amongst the members as to taking office; the majority of them did not trouble, because they thought their Council and officers were quite capable of carrying the whole weight of the Institution, and until some paper which directly interested them came up for discussion they stayed away.

Dealing with the office of Branch-President, he reminded the members that Mr. W. Lambert, M Inst.C.E., was Senior Vice-President, and he was pleased to know that Mr. Lambert would succeed himself as President. He assured them that he would leave the Chair with a certain amount of regret. At the same time, he felt that he was leaving the Chair in favour of a man more capable than himself, although he had thrown all his energies into the work.

Mr. Lambert was elected Branch-President for the following session, Mr. Slater continuing in office until the end of the present session, in June.

Colonel W. F. Cheesewright, D.S.O., was unanimously elected Senior Vice-President in place of Mr. Lambert, and Mr. G. C. Pierce was elected Junior Vice-President.

The Secretary said that in asking for an Assistant Secretary he was bearing in mind that in the coming year it was highly probable that the annual conference would be in London, and he proposed that Mr. Longden should be elected Assistant Secretary, which was carried. Mr. Cole-Estep was elected to fill the vacancy on the Branch Council.

The delegates to the General Council were Colonel Cheesewright and Messrs. H. O. Slater and A. R. Bartlett.

HANDLING REPEAT JOBS.

Mr. Bartlett then read his paper on "Handling Repeat Jobs," which was printed in the last issue of The Foundry Trade Journal.

Discussion.

Mr. J. Ellis (Past-President), opening the discussion, said that the multiplicity of machines which Mr. Bartlett had shown on the screen made the layman wonder what machines he should use, and that was one point which it was very difficult for the employers to decide. It could only be decided by the man who knew what work was going to be made. They had all experienced difficulty in the foundry as to what machines should be used; the employer had a pet machine which he wished to instal, which was probably not a bit of good for the purpose for which it was required. The machine had yet to be found which is superior to plate moulding in some instances; there was not the slightest doubt that for certain classes of work plate moulding was far preferable in every respect to machine moulding. Then, again, the power-ramming machine *v.* the hand machine was also a question well worth thinking about. He remembered having two machines, one a jolt-ramming turnover machine, for small work; it was quite an up-to-date machine, costing somewhere between £400 and £500, and could deal with 30 boxes a day, with two castings in each box. Side by side with that was a small hand-ramming turnover machine, which cost somewhere about £30 or £40, and which turned out a similar class of work. The man on the hand-ramming machine kept pace with the man on the power machine. That only applied to small work, because it must be remembered that while the mechanism of the jolt machine was at work the man was standing idle, but in the case of the hand-ramming machine the man was employed all the time. They were undoubtedly saving a man's energy on the power machine, but when it was remembered that the one man on the hand machine was turning out the same number of boxes as the man on the power machine, boxes which were very similar in every respect, the matter was worth thinking about. In conclusion, he expressed his thanks to Mr. Bartlett for his Paper.

Mr. V. C. Faulkner said he would hesitate to criticise such an expert as Mr. Bartlett, but he had said that there were three types of ramming machine. He (Mr. Faulkner) insisted that there was a fourth, *i.e.*, the sand-throwing machine. There was, perhaps, very little detail available at the moment, but he would like Mr. Bartlett's opinion as to the prospects of this machine, which was considered to be epoch-making. It was said—he believed with some truth—that this machine could ram up a bath core in 4½ minutes. He had had something new put to him recently, namely, plastic wood. This was as strong as wood, being just about the same in tensile, but even stronger in transverse test. It could be machined like wood, but was slightly harder, and he was wonder-

ing whether this material would be useful for making some of the plates, instead of using plaster of Paris. If anybody had any experience of it, he would like to have their views.

Snap Flasks and Slips

MR. J. LONGDEN said that Mr. Bartlett had made what might be called only a passing reference to snap flasks, and had said that there were great possibilities for the use of the snap flask for shallow work. He considered that the scope of the snap flask was not nearly so circumscribed as Mr. Bartlett had led them to believe. He had seen a man hand-ram 110 rheostat grids in a day, in a 14 in. × 12 in. snap flask, on a Pridmore machine. That was shallow work, but there was a considerable quantity of deep and heavier work cast in snap flasks, which was done with the aid of slips. These slips were constructed to the size of the block of sand left by the snap flask, and slipped over the block of sand before casting. A weight was placed on, and after casting, and a sufficient time had elapsed for the casting to set, the slip was lifted off and carried to the next, and so the process went on. Very little waste resulted from the use of the slip and the snap flask as opposed to the use of the box, and the mould could come fairly close to the edge of the snap flask, if he could put it that way. There was considerable scope for the use of the snap flask in the foundry, and in the Manchester area considerable use was made of it in that way. Mr. Bartlett had made no reference to the follow-board; he had, perhaps, regarded it as a modification of the plate, which it certainly was. There were two boards, on one of which half the pattern was placed, and on the other board the other half was placed, the two moulds being rammed separately. In this way they could be rammed successfully, and considerable saving ensued. With regard to the jar-ramming machine, he had been rather interested in Mr. Bartlett's reference to the reason why the jar-rammed mould was so satisfactory. He had said that the sand nearest the pattern was the hardest, and the back sand was not so hard, and consequently, that venting was easier. He (Mr. Longden) believed the universal experience to be that freedom from scabs and similar difficulties, resulting from the use of jar-ramming, was astonishing. He was uncertain that Mr. Bartlett had given the key to the reason. It was suggested in some quarters that jar-ramming induced a settling down of the sand in such a way that the long axes of the particles of sand tended to become vertical, and thus venting was easy. It did not necessarily follow that this was an aid to venting. With regard to the sand nearest the pattern being a little harder than the back sand, most of them knew that in ordinary green-sand moulding the use of the rammer resulted in scabs, because the rammer approached too closely to the pattern, and a hollow scab was obtained. What was the reason of that? A partial lifting-up of a piece of the mould resulted, and the metal went underneath it. In many cases, when a piece of sand was not completely detached, they got a raising of the face of the mould, to ⅛ or perhaps ¼ in., and the metal would get underneath it, resulting in a hollow scab. It was a problem which nobody had satisfactorily solved. It had occurred to him that when the sand had been tightly rammed, owing to the rammer being close to the pattern, it was more closely packed, and consequently there was more gas generated within a given period of time, and a sort of pocket of gas was formed below it, resulting in the lifting up of a small lump of sand, producing a scab. But what actually took place it would be interesting to know.

Stratification of Sand by Jarring

MR. WESLEY LAMBERT, referring to the question of "scabbing" raised by a previous speaker, said he was wondering whether the action of a jar-ramming machine, by causing the larger grains of sand to work to the top, in the same manner that by hand-shaking one can bring the coarser pieces of sand or gravel to the top of a vessel, had the effect of gradating the sand; the finer sand filtering down nearest to the surface of the moulding plate, and the coarser particles working towards the back of the box. If these conditions prevail, the gases evolved from the heated sand would more freely escape.

MR. GIBBS (Foundry Instructor, Sir John Cass Institute) said he was pleased to see that Mr. Bartlett advocated putting patterns on plates, even if they had only a few to make from them. In their own foundry they very often required the pattern-makers to make a fairly stiff wooden plate, and fix on wooden patterns, if there were only 50 or 100 to make from it. Mr. Bartlett had spoken of a French ramming machine which rammed the bottom and the top together, and had referred to the use of boxes. To him, it seemed that there was a possibility of some sand squeezing in between the pattern plate and the box, especially on the bottom half. He was wondering whether, when the boxes were put together, there might be some sand in between, allowing a run out. Had Mr. Bartlett had any difficulty in that respect? Again, had Mr. Bartlett ever experienced any difficulty in the use of jarring machines where a pattern had an overhanging piece which necessitated a draw back or a draw in, such as a lug, as possibly with the continual jarring of the sand under the projection they would not get the exact shape of the pattern.

Pins and Pin-holes.

The BRANCH-PRESIDENT asked Mr. Bartlett whether he did not think that, instead of having a pin in the top part and the bottom part of the box, it would be much better, in order to avoid mistakes through putting the box on the wrong way about, to have a square pin and a round pin on the bottom half of the box, rather than to have a pin in the top and a pin in the bottom. That was a very trying question in plate moulding. With regard to the new plastic wood, he was sure that during his experience in the malleable trade he would have been extremely pleased to have known that there was such a thing on the market. Designers of patterns in the malleable trade made very many mistakes, such as the thickening up of fillets. In the malleable trade a square corner was absolutely fatal, and very often when a customer sent a pattern into a works it took very nearly as much time to put the pattern right as to do the job.

Dealing with moulding machines, MR. SLATER said that in his opinion the only really efficient moulding machine was one where the mould left the pattern from the bottom; the pushing of the box and the mould away from the pattern he believed was absolutely hopeless.

Plastic Wood.

MR. MCRAE SMITH said that plastic wood had come to his notice during the last few weeks. Mr. Longden had mentioned that plastic wood was coarse in grain, but he believed that that was another type of plastic wood. There was at one time a plastic wood on the market which was used more for flooring, etc., consisting of sawdust, magnesite, magnesium chloride, and linseed oil. That which Mr. Faulkner had referred to was quite a new thing, and he agreed that there seemed to be something in the way of possibilities for it.

The Lecturer's Reply.

MR. BARTLETT, replying to the discussion, said Mr. Longden had spoken of snap flasks as being very efficient tools; he agreed that they were. His firm had used them for a good many years, and still used them at times, but he contended that snap flasks, so far as his experience went, required more labour to handle in some instances than permanent boxes. At the same time, snap flasks had advantages over permanent boxes in some ways; they did not want so much storage room. With regard to the use of a slip, as mentioned by Mr. Longden, Messrs. Brotherhood used frames inside the snap flask boxes. These were steel frames rammed up inside the box, which made it a permanent box, but it was assembled on the snap flask principle. With regard to follow boards, there was no difference between them and pattern plates, except that they had wooden pattern plates instead of iron, as he understood them. He used them a great deal in moulding machines instead of pattern plates in the ordinary way. Even with bushes, etc., they had a deep board made, and the hollow part of the bush was carved out. Really, a follow board was nothing more nor less than a pattern plate. As to the solidity of the sand nearest the pattern in a jar-ramming machine, he had only given his own experience when using a jar-ramming machine, and that was that the sand was more solid at the point of resistance, *i.e.*, the

XUM

surface of the pattern plate. As to Mr. Lambert's question, naturally they used fine sand nearest to the pattern, and rough sand for backing, which also helped to vent the mould.

Continuing, Mr. Bartlett dealt with the point as to he length of time required to make a successful pattern plate. Mr. Sherburn, foundry manager of the Richmond Stove and Grate Company, made pattern plates before moulding. He had found that pattern plate work on the floor was more economical than machine moulding for his type of work. He had said that he was as long as two years getting a particular pattern plate he desired, owing to trouble through distortions, etc.

With regard to wooden pattern plates, mentioned by Mr. Gibbs, he himself used more wooden plates than anything else. The pattern plates were practically only follow-boards, and, as he had said, they screwed them on to the table of the machine and rammed on top. As to the possibility of sand getting in between the boxes of the French moulding machine, they did not always successfully ram the sand down definitely to the moulding box, but seeing that they usually did shallow work it was a matter of indifference. The joints were perfect, the plate came down to the surface of the sand at the bottom, and the top of the box was put on as with the ordinary pattern plate. There was no sand between that and the pattern plate, and there was no sand getting in between the joint and causing any trouble. He had mentioned in the paper the difficulty of getting under bosses and overhanging parts in jar-ramming, and to do that successfully they must put cores underneath those parts. A past President of the London Branch, Mr. Gaunt, used to ram crank-cases on Osborne jarring machines, using wooden boxes, and as aluminium was not liable to strain out, he cut holes in the side of his moulding box where the bosses were, and he used to loosen the sand and ram in there by hand, in order to avoid putting cores in. He personally always put in cores for the overhanging parts. With regard to the Branch President's suggestion as to using square and round pins, in order to avoid putting the box on the wrong way round, he pointed out that the square and triangular pin both had a tendency to wear at the corners, and they became loose much more quickly than when using round pins. In his opinion, one pin at the top and one at the bottom was the most efficient method, the pins being round. With regard to methods of drawing boxes, he had only mentioned the various ways in which that was done; in each individual job the method of drawing should be decided on its merits.

The lecturer was accorded a vote of thanks.

COVENTRY BRANCH.

FOUNDRY PROBLEMS.

At a meeting held on March 5 Mr. F. Hill gave a lecture on "Some Foundry Problems." In the course of his remarks, Mr. Hill said some years ago an order was received for a large quantity of parallel pipes which opened out at each end to form a single barrel. Considerable trouble was experienced from the first with the cores, the metal belching out of the mould just as quickly as it was poured in. To find a remedy for this seemed quite impossible, as every conceivable dodge was tried. Vent holes were gradually enlarged, sand cores, loam cores, cores with and without manure, were tried all with the same result. But eventually the idea of a sand core with a vent hole greatly reduced was tried, which immediately answered the purpose. Yet the small vent seems to be a contradiction of the usual trade practices, which is to get all gas away as quickly as possible.

Another interesting experience which again seems a contradiction of the usual foundry knowledge. This job was for an electrical purpose, and, as quite a number were wanted, they were sent in batches to the marking-off table for convenience. They were about 2 ft. in diameter and 2 ft. 6 in. in height, being cored out and leaving about 3½ in. thickness on average, with facing top and bottom. But as soon as the marker-off took them in hand he found they were too big over all, and to have brought them down to proper dimensions would have taken the entire facing away, and cut into the body. Of course, the loose ramming of the mould was the cause assigned at once. Others were made, every precaution being taken to ensure a good result; but these proving exactly the same, other causes had to be sought for the trouble, and at length the discovery was made that there was no contraction in the metal, with the consequence that the pattern had to be reduced in order to get the required result. The special precaution was taken of getting the mixture that brought about such a result, but cannot even to this day find any reason why such a peculiarity should have occurred.

Examples such as have been enumerated must have occurred in the experience of every practical man.

A Cupola Trouble.

The cupola was of the ordinary type of deep belt, double tuyères and breeches wind pipe, erected as being capable of melting 5 tons per hour, which it did not do. From the length of time the blow ran and the amount of coke burned, trouble always ran high between cost department and foundry. In due course it was essential that something should be done to remedy this state of affairs, and it was decided to brick up the bottom tuyeres, which had the effect of increasing the melting zone and the depth of the furnace well. Scales were installed on the stage and every charge weighed, both coke and metal. The custom had been to allow about 12 lbs. of coke per cwt. of iron, but it was decided to reduce this amount gradually, the Newton Chambers coke being used. This decision was rigidly adhered to, and we found that with 7 lbs. of coke we could get a more fluid iron, very much hotter, and instead of the usual amount a weight of nearly 7 tons per hour was obtained, which was considered satisfactory. This clearly indicates that after all these years of experience there should be no question as to the exact amount of fuel required to do a certain amount of work; for since the fluidity of the iron depends upon the heat imparted to the metal in the furnace, one would have thought that from an economic view alone this problem would have been solved years ago. It will be agreed that a cupola has its peculiarities, and many are the theories put forward by furnacemen as to the best method of construction, shape, size, well tuyeres, and so on, which are fancied by different men, but in the particular instance mentioned we just took notice of tuyères alone in the construction, and by careful watching succeeded in reducing the fuel to the amount stated, and this practice was followed with entire satisfaction up to the time the speaker left the works.

Referring to the late President's (Mr. Hurren's) remark in the presidential address on waste, in which he said "I consider that quite a quantity of waste work is brought about by the careless methods of some men in throwing rough sand from the floor or heap containing small pellets of iron on to the pattern instead of using the riddle. These pellets find their way to the face of the mould and act as chills on the casting, which in turn is responsible for the hard, patchy, streaky iron complained of by the machinist." The lecturer entirely concurred. But there is another reason for hard iron, due to the common practice of cooling metal to the proper pouring temperature by the addition of cold scrap. Patchy or streaky iron, due to the fact that it is impossible to raise the cold scrap to the temperature of the metal hot from the furnace. Whilst melting is accomplished successfully only a streaky mixture of chilled metal is produced both in the mass and in the mould.

In conclusion, a greater co-operation between the scientific, technical and practical methods must be secured to solve the every-day problems of the foundry. But the method of diffusing this practical knowledge is so limited and the foundryman so conservative in his ideas, that the deepest problem of all in connection with the trade is unconscious ignorance.

ALUMINIUM CORE-MAKING.

By S. Corden.

The methods of making aluminium cores can be divided into three heads:—(i.) greensand, (ii.) dried moulders' sand, (iii.) a variety may be called aluminium sand. Greensand is the same sand as

moulders use in ramming up their boxes, and of it innumerable cores are made. Most shops use this method where possible, simply because it is obviously much cheaper and quicker than using dried cores. The moulder can use them immediately they are made, and so castings can be turned out much quicker by this method. Castings such as top and bottom tanks for radiators, gearboxes, back axles, crankcases, and others can be made with greensand cores, but it does not necessarily mean that it is always the best method because it is quicker and cheaper, as there are difficulties to overcome. One of these is small holes, generally found in the top of the casting, caused by the steam rising to the top of the mould and not having time to get away before the metal had filled the mould, with the result that holes appear. Also it is advisable not to use the sand too wet, as this will only add to the trouble.

There are some cores that, while it is possible to make the body core in greensand, it is often necessary to make loose cores in dry-sand and place them in their position afterwards. This certainly made them better, but did not quite overcome the difficulty. When, however, they were made separately and the two end-cores dried, no more trouble was experienced.

Dry Sand Cores.

Dried moulder's floor sand is used chiefly for small cores where there is a fair thickness of metal —say 1 in.; under which figure there is a risk of cracked castings. Cores made with sand can be easily handled, both green and dry, and can be placed one on top of the other without fear of breaking, thus saving stove room; and they can be stored for a considerable time without the least effect on them. These cores give trouble when removing from the casting, but care in the use of water makes all the difference.

Aluminium Sand.

Aluminium sand is composed of 3 barrows black sand from the iron shop, 1 barrow of aluminium floor sand, and 1½ riddles of sawdust put through a sieve. This mixture can be quite safely used for all classes of aluminium castings, from a cylinder jacket to a gear box, but this sand requires drying. Where it is not possible to use greensand, in cases which incorporate intricate parts, or where cores have to be placed in position in the body core after they are dry, in all these cases the sand cannot be wrongly used. Care should always be taken in ramming, which must not be too hard or too light, but something in between. This is a difficulty when boys make the cores. To overcome this a little more sawdust should be added to the sand which is usually effective. Some coremakers try to make their cores as soft as it is possible to get them, but this usually results in broken cores. It is not necessary to get them too soft. Cores made in this way are easily released from the casting and can be handled by the moulder without any fear of breaking. The same mixture can be used for pipes. No vents are necessary when using dry sand, except for pipes and the like, when it is advisable. Great care should always be taken when putting grids or wires in the cores. As much room as possible should always be taken so as to allow for the contraction. If it is essential to place wires to the faces of the core, use two wires instead of one, which overlap at the centre, which allows the casting to contract when cooling.

In reference to the chilling of castings this is very often important and very often causes wasters where they would not occur otherwise. Consideration by the moulder and core-maker can often eliminate all chilling, simply by placing the runners and risers over or against the thickest parts. In one crankcase, 34 chills were used in the cores alone which even then pulled. Six chills are now put on the job, and no trouble is experienced. It is often the case when a new job comes into the shop, the moulder and the core-maker look over the job to see how many chills they can put on it instead of seeing how many they can do without. All bearings, however, should be chilled whenever possible as this ensures that part being solid.

AVON FOUNDRY (WARWICK), LIMITED.—It was resolved March 29, confirmed April 13:—That the company be wound up voluntarily. Mr. B. S. E. Hayward, secretary, has been appointed liquidator.

Overcoming a Waster.—I.

The object of this article is to show how the alteration of one small phase of moulding converted a process making wasters into a successful one.

Fig. 1 shows a box about 4 ft. × 3 ft. 6 in. × 3 ft., reinforced by ribs at each side. It was moulded flange-down. Rods were driven into the ground to secure the core, or centre part of the mould. The top of the pattern was loose to allow of its accomplishment. After the centre was rammed up, a small bed of ashes was formed at A, connected by a pipe B with the coke-bed C, which in its turn was provided with an exit pipe D. At

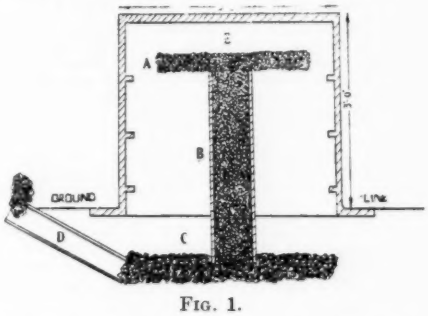


FIG. 1.

the time of casting the air or gas was not fired or lighted as soon as it ought to have been, and consequently there was a loud report, due to an explosion in the mould, caused by the back-fire of the gas generated in the core.

When the casting was removed from the mould it was obvious what had happened. The top part of the core E had been completely blown off by the explosion. Before making any radical change in the procedure, it was decided to mould the next one in exactly the same manner, but care was taken to place some wood shavings at the end of the vent pipe D, and to light it just *before* the metal was poured into the mould. The gas was lighted as soon as it was generated. There was no report or explosion, and the casting was in every respect satisfactory.

Enamelled Steel Manufacture.*

The author describes the production of enamelled steel vessels at Rochester, N.Y. Enamelled steel tanks were preceded by glass-lined tanks, made by fusing finely-ground French plate-glass on to the steel vessels. The sheet steel is fabricated, and the joints in the vessels are acetylene welded. After grinding the surplus metal at the joints, the steel vessels are treated by sand-blast. The enamel is applied by both wet and dry processes, and different coatings are in use: (*a*) for the malt industry; (*b*) for the dairy, soft drink, and pharmaceutical trades; (*c*) for acid-proof work; and (*d*) for decorative work. The raw materials ordinarily used are ground sand, quartz, feldspar, borax, cryolite, fluorspar, sodium and potassium compounds, and clay, the basis of all enamels being SiO_2. The proportions of each required for a definite enamel are mixed, smelted together, and ground up wet in ball mills to form a "slip," which may be applied to the steel surface by spraying machines. Acid-resisting ware for chemical plants may be treated by the dry process or "dusting"—the metal surface being wetted and the dry powdered frit dusted on. The process of burning on the enamel is carried out in furnaces at a temperature of 815 to 1,090 deg. C., the work being revolved while burning. The surfaces are inspected and tested for enamel perfection before shipment.—C. H. JONES (Chem. and Met. Eng. 25, 883-886).

MR. ALEXANDER BROWN died last week at his residence, Arbuthnot, Falkirk, in his 87th year. Mr. Brown, who was a native of the burgh, founded the Forth & Clyde Iron Company at Falkirk about forty years ago. Afterwards the company amalgamated with the Sunnyside Company.

* Institution of Civil Engineers (Abstract)

Trade Talk.

Mr. R. Vogel, engineers' agent, has removed to 5, South Street, Finsbury, London, E.C.2.

The Export Credits Department of the Board of Trade is to be closed on September 8.

After being closed for about a month, the Calderbank Steelworks, near Airdrie, have restarted.

Metal Traders, Limited, Gracechurch Street, E.C., have established a branch at 20, York Street, Manchester.

Parker & Sharp, engineers, formerly of Peaseholme Green, have removed to Cambridge Street, Holgate Road, York.

Mr. H. Hind has established himself in business as a consulting electrical and mechanical engineer at Exchange Buildings, Stockton-on-Tees.

Swan, Hunter & Wigham-Richardson, Limited, announce the completion of purchase of the North British Diesel Engine Works at Glasgow.

Messrs. E. W. Bartlett & S. C. Crocker, electrical and mechanical engineers, 1, Pembroke Terrace, Cardiff, trading under the style of the Heath Electrical and Mechanical Engineering Company, have dissolved partnership.

Fitters and smiths, who had been affected by the engineers' dispute, resumed work at Millom Iron Works on Monday. Only one furnace is in blast there as yet, but another is being prepared, and a third is stated to be ready if required.

Drake & Gorham Wholesale, Limited, have established a branch at 35, Broad Street, Bristol, and have appointed Mr. A. J. Nicoll as manager. They were formerly represented in Bristol by H. R. Cleave & Company, of 6, Bristol Bridge.

In the Chancery Division, recently, Mr. Justice Astbury sanctioned a scheme of arrangement altering the rights of the preference and ordinary shareholders of Henry Bessemer & Company, Limited. Counsel said it had been agreed to practically unanimously.

The Carborundum Company, Limited, have taken over the business of Mr. Wm. M'Gregor, at 7, West Regent Street, Glasgow, their former agent. Mr. E. M'Gregor, who managed the business, will continue in that capacity on behalf of the Carborundum Company, Limited.

Reinforced concrete road foundations are just about to be laid in the Surrey Commercial Docks for the Port of London Authority. The reinforcement to be used is B.R.C. fabric manufactured by the British Reinforced Concrete Engineering Company, Limited, of Manchester.

Messrs. Automatic and Electric Furnaces, Limited, of 281-283, Gray's Inn Road, London, W.C.1, have introduced a marine-type of Wild-Barfield electric furnace for use on board ship. This type of furnace has been inspected by Admiralty experts and passed for use on H.M. ships.

Licences under the Non-Ferrous Metal Industry Act, 1918, have been granted to Allen, A. V., Chain Walk Works, Birchfield, Birmingham; Brown, S. J., 89, Hill Top, West Bromwich; Lawday, Guillermo, 577, Salisbury House, London Wall, London, E.C.2; and Spitzer, M., 33, Old Broad Street, London, E.C.2.

The 74th anniversary festival dinner of the Royal Metal Trades' Pension Society will take place at the Cutlers' Hall, London, E.C.4, on Tuesday, May 30. Mr. Wm. Clark, J.P., managing director of Vickers, Limited, River Don Works, Sheffield, will be in the chair, and Mr. John Hall, of Hall & Pickles, in the vice-chair.

The business of the Lassen Meter & Engineering Company has been acquired by James Gordon & Company, Limited, Windsor House, Kingsway, W.C.2. Mr. J. J. Lassen has been elected joint managing director, and will take charge of that section of the business dealing with boiler efficiency appliances and instruments.

Capt. A. Makins, who for some time past has been controlling the motor transport department of Clement Talbot, Limited, has now been appointed general sales manager for the "W. & G." lorries at 177, The Vale, Acton. Capt. Makins will also handle the new "Makrob" gravity tipper recently introduced on the market.

Based on the new ascertainment Cumberland iron miners' wages are as follows:—Miners working bargains, 9s. 11d. per shift; miners' minimum, 7s. 3d.; underground first-class, or leading, labourers, 6s. 4d.; winding engine men, 8s. 8d.; joiners and blacksmiths, charge men, and mineral shot borers, 9s. 1d.; assistant deputies, 7s. 9d.; boys' wages have also been reduced very slightly.

The Home Secretary has made an order authorising the employment of male young persons of 16 years of age and over in the polishing and winding of steel strip at the works of the Effingham Steel Works & Rolling Mills Company, Limited, Royds Mill Street, Sheffield, on two day shifts, subject to the conditions that no worker shall be employed in the afternoon shift in consecutive weeks, and that suitable messroom accommodation shall be provided.

Stothert & Pitt, Limited, of Bath, have been instructed by the Bristol Docks Committee to install at Avonmouth Docks four electric gantry cranes, each of a lifting capacity of 1½ tons at 45 ft. maximum radius, to travel on rails spaced 8 ft. 6 in. centre to centre. The machines will be of the four-motor type, and arranged with the "Toplis" patent horizontal luffing system, as already fitted to other cranes supplied by Messrs. Stothert & Pitt to the Avonmouth Docks.

A conference has taken place at the offices of the Ministry of Labour at Dublin between representatives of the shipyard companies and employés in connection with a proposed reduction in wages, of which notice had been given by the companies. After lengthy discussion on the present industrial position it was agreed that no reduction should take place owing to the abnormal conditions prevailing, and the proposals put forward at the yards were for the present withdrawn.

The 69th anniversary festival dinner of the London Association of Foreman Engineers was held last week, the chair being taken by Mr. F. W. Bellamy. Among those present were: Mr. C. F. Quicke, Mr. H. J. Ambrose (president of the Association), Mr. J. Gough, Mr. W. Bamford, Mr. C. Eggleston, Mr. W. Ashton, Mr. J. S. Morris, Mr. G. W. Knight, Mr. R. M. Campbell, Mr. A. A. A. Byrd, Mr. G. W. Bartle, Mr. G. Connor, Mr. F. Williamson, Mr. W. H. Robinson, Mr. J. H. Smith, Mr. A. J. Mansfield, Mr. W. Cross, Mr. G. Shields, Mr. E. C. Hopworth, Mr. C. J. Rutter, Mr. F. J. Thompson, Mr. G. Westlake, Mr. A. Williams, Mr. R. Arnold, Mr. F. S. Baker, Mr. E. G. Morris, Mr. W. J. Hillier, Mr. J. H. Baker, and Mr. J. Harrington (secretary).

I.B.F. President's Visit to America.

Mr. Oliver Stubbs, President of the Institution of British Foundrymen, and Mr. Thomas H. Firth, Past-President of that Association, were entertained by the Pittsburgh Foundrymen's Association on April 24, 25 and 26. Following plant inspections, which included the Homestead Works of the Carnegie Steel Company, the Mesta Machine Company, the Westinghouse Electric & Manufacturing Company, the Union Steel Castings Company, and the Pittsburgh Rolls Corporation, a banquet was tendered at the Duquesne Club on the evening of April 25. Mr. A. L. Humphreys, President, Westinghouse Air Brake Company and the Union Switch & Signal Company, presided. In an address following the banquet, Mr. Stubbs voiced the appreciation of his countrymen for the close co-operation and invaluable aid rendered by American foundrymen during the war. Mr. Firth explained in detail some of the underlying facts of present-day problems in Great Britain. Other speakers included Mr. C. B. Connelley, Labour Commissioner of Pennsylvania; Mr. F. J. Lanahan, general manager, Fort Pitt Malleable Iron Company; Mr. C. S. Koch, President, Fort Pitt Steel Casting Company; and Mr. C. C. Smith, Chairman of the board of directors, Union Steel Castings Company.

On their arrival in Cleveland the British guests were met by a committee headed by Mr. Franklin G. Smith, President, Osborn Manufacturing Company. Plant inspections included Allyne-Ryan Foundry Company, Cleveland Co-operative Stove Company, Osborn Manufacturing Company, and the National Malleable Castings Company. On Friday night, April 28, a testimonial dinner was tendered at the Union Club by the Cleveland foundry and allied industries. Mr. John A. Penton, President, Penton Publishing Company, presided. Mr. F. A. Scott, vice-president, Warner & Swasey Company, in an able address, traced the development of Cleveland as a "hammer and tongs" centre of industry. He welcomed the British visitors, and expressed to them the respect and consideration of Cleveland manufacturers for the industrial accomplishments of their nation. Mr. Oliver Stubbs, in replying, dwelt upon features which he had observed in American manufacturing practice, and submitted some new thoughts on world-wide economic conditions.

Mr. Myles Kennedy, of Ulverston, has resigned his appointment as one of the representatives of owners of iron-ore mines and quarries on the Advisory Committee for the Metalliferous Mining Industry, and Mr. D. F. Gill has been appointed to succeed him.

Reductions in Railway Rates.

In December last the English and Welsh railway companies, in notifying particulars of reductions in rates to operate as from January 1, 1922, intimated that they would give consideration to the question of making further reductions as soon as circumstances admitted of their doing so. Since the reductions of January last the companies have met several deputations, the representations made thereat practically covering every branch of industry throughout the country. In every instance the companies were asked to make a substantial reduction in the existing rates, including those applicable to traffics for which reductions had already been made.

Rates to be Charged.

The rates in operation on January 14, 1920 (except rates operating for specified periods, which periods have expired since January 14, 1920, or rates which are in force under the terms of special agreements), with the undermentioned additions thereto :—

TRAFFIC IN CLASS A OF THE GENERAL RAILWAY CLASSIFICATION (OTHER THAN COAL AND COKE).—Iron ore, ironstone and limestone. Burnt iron pyrites. Cinders. Hammer scale. Manganiferous iron ore. Mill cinder. Mill scale. Puddle tap. Purple ore. For blast furnaces and steelworks. Percentage increase to be further reduced from 75 per cent. to 50 per cent. Flat rate to remain at 3d. per ton. Maximum addition to remain at *2s. per ton.

Traffic in Class A other than above.—Percentage increase to be reduced from 100 per cent. to 75 per cent. Flat rate to be reduced from 6d. per ton to 3d. per ton. Maximum addition to remain at 4s. per ton.

TRAFFIC IN CLASS B OF THE GENERAL RAILWAY CLASSIFICATION (OTHER THAN PATENT FUEL).—Iron and steel. Chrome iron ore. Manganese ore. Lime for iron and steelmaking. Basic material. Burnt limestone. Calcined dolomite limestone. Ferro-silicon. Silico-manganese. For blast furnaces and steelworks. Percentage increase to remain at 75 per cent. Flat rate to be further reduced from 4d. per ton to 3d. per ton. Increase to be limited to a maximum of 6s. per ton.

Traffic in Class B other than above.—Percentage increase to be reduced from 100 per cent. to 75 per cent. Flat rate to be reduced from 6d. per ton to 3d. per ton. Increase to be limited to a maximum of 6s. per ton.

IRON AND STEEL IN CLASS C OF THE GENERAL RAILWAY CLASSIFICATION.—Percentage increase to be reduced from 100 per cent. to 75 per cent. Flat rate to be reduced from 9d. per ton to 6d. per ton.

The Scottish Railway Companies are not parties to the reductions above set out, and therefore the rates between stations on the Scottish Railways and between stations in England and Wales and stations on the Scottish Railways at May 22, 1922, will remain in operation.

National Foundry Competition.

Date for Closing of Entries Extended to May 27, 1922.

Mr. Thos. Vickers, the honorary secretary of the Technical Advisory Committee, informs us that, with reference to Class A. and B. for core making and mould making, it has been decided to throw open the competitions without any age limit. Therefore foundrymen can now compete irrespective of age, but age will be taken into consideration in making the awards.

A special blue ribbon prize of £10 10s., presented by the Worshipful Company of Ironmongers of London (and a diploma), will be given for the pattern adjudged to be the best in the entire Class C. (pattern making). The winner of this prize will not be allowed to take a further prize in this class.

Publications Received.

The Incorporated Swansea Exchange, Royal Metal Exchange, Swansea, thirty-fourth annual report for the year 1920-21, price 3s. 6d.

"Current Opinion," May. Price 3d. monthly. The official organ of the Industrial League and Council, 82, Victoria Street, London, S.W.1.

ZONE AND POPULATION MAP OF THE BRITISH ISLES.—Published in accordance with the census figures of June, 1921, by the Dorland Agency, Limited, 16, Regent Street, London, S.W.1. Price 1s. 3d. each, post free.

Company News.

Macdynamo Engineering Company, Limited. — Capital £1,000 in 2s. 6d. shares. Directors: S. Milligan and J. Summerfield. Registered office: 28, Bateman's Row, E.

Lackawana Steel Corporation of Britain, Limited.—Capital £25,000 in £1 shares (15,000 preference and 10,000 ordinary). Registered office: H11, Exchange Buildings, Liverpool.

Engineering & Commercial Trading Company, Limited.—Capital £1,000 in £1 shares. Directors: H. L. Neame and A. J. Glock. Registered office: 124, Victoria Street, Westminster.

London Metal Pressing Company, Limited.—Capital £3,000 in £1 shares. Directors: W. A. Cunningham, H. A. Webb, and G. W. Webb. Registered office: 10, Park Road, High Barnet, Herts.

Lennox Manufacturing Company, Limited.—Capital £23,500 in £1 shares, to adopt an agreement with the Lennox Manufacturing Company, general engineers, and David Dunbar. Registered office: Hardgate, Duntocher, near Glasgow.

Brown Brothers, Limited.—Profits, £33,608; brought forward, £29,619; preference dividend for year paid; reserve, £1,673; final ordinary dividend, 2½ per cent., free of tax, making 5 per cent., free of tax, for year; carry forward, £25,929.

Jane Pit Store, Limited. — Capital £5,000 in £1 shares. Engineers. Directors: A. K. Kirsop, A. Bell, H. R. Wilson, D. T. Massie, and J. McLaren, junr. Secretary: J. Kirsop. Registered office: 41, Blackett Street, Newcastle-on-Tyne.

Bodley Brothers & Company, Limited.—Capital £12,100 in £1 (8,000 first preference and 3,873 second preference and 227 ordinary). Engineers. Directors: Alice M. Bodley, H. Campion, and R. Fey. Registered office: 47, Commercial Road, Exeter.

John Jowett, Limited.—Capital £6,000 in £1 shares. (1,500 5 per cent. cumulative preference). Tool manufacturers. Directors: S. Sissons, Alberta B. Sissons, H. N. Sissons, W. Sissons, and A. J. Forsdike. Secretary: S. Sissons. Registered office: Albion Works, 82, Countess Road, Sheffield.

Personal.

MR. F. WRIGHT has been appointed chief electrical engineer to Matthews & Yates, Limited.

MR. H. J. SPOONER, head of the Polytechnic School of Engineering, Regent Street, W., is retiring.

THE LATE Mr. D. R. Jenkins, of Ar Fryn, Pentrepoeth, Morriston, Glam., engineer, left £24,014.

MR. W. INGLIS has been appointed Lancashire representative of Laurence, Scott & Company, Limited.

THE LATE Mr. F. C. Wearing, of Carters Green Foundry, West Bromwich, left estate valued at £6,965.

THE LATE Mr. R. Ashburner, retired shipbuilder, of Newlyn, Crosslands Park, Barrow-in-Burness, left £36,409.

THE LATE Mr. S. R. Blundstone, consulting engineer, member of the Council of the British Electrical Federation, left £19,335.

MR. J. A. RICHARDS, managing director of the Clan Foundry Company, Limited, Queen Street, Belper, has been re-elected to the Belper Urban District Council.

THE RIGHT HON. THE EARL OF DERBY has accepted the presidency of the British Electrical and Allied Manufacturers' Association. The Right Hon. Lord Ampthill, who now retires from the presidency, has accepted the office of first past-president of the Association.

MR. T. F. FAWCETT, secretary of the Carlton Iron Company, Limited, has been the recipient of a presentation from the officials, staff and foremen, on the occation of his retirement. Mr. Fawcett, who has retired owing to ill-health, has completed 48 years' service with the Carlton Iron Company.

MR. T. E. THIRLAWAY has been elected vice-chairman of Swan, Hunter & Wigham-Richardson, Limited, Wallsend. Mr. Thirlaway joined C. S. Swan & Hunter, Limited, in 1898 as chief accountant. In 1903, when C. S. Swan & Hunter, Limited, amalgamated with the firm of Wigham-Richardson & Company, Limited, of Walker-on-Tyne, under the style of Swan, Hunter & Wigham-Richardson, Limited, Mr. Thirlaway was appointed chief accountant of the amalgamated company, and later to a seat on the board. He is a director of Barclay, Curle & Company, Limited, the Glasgow Iron & Steel Company, Limited, the North of Ireland Shipbuilding Company, Limited, and the Wallsend Slipway & Engineering Company, Limited.

XUM

IRON AND STEEL MARKETS.

Pig-iron.

The long-delayed settlement of the engineers' dispute is now having a serious effect upon the pig-iron position, many of the foundries and other consuming industries necessarily restricting orders for material until more normal conditions are resumed. The decreased demand applies especially in the case of foundry pig, and both in the Midlands and Lancashire buying continues on a very limited scale, manufacturers hesitating to stock iron while the present uncertainty continues. In South Staffordshire, also, forge iron has been affected to an appreciable extent, the engineering trades taking much less rolled iron. In the face of these conditions the tone of the markets is comparatively firm, producers resisting any reduction of quotations, regarding it probably as useless to attempt to stimulate buying by this means until there are signs of reviving activity in the trades affected. In the Cleveland district similar conditions are apparent as regards business with home consumers, but in this market smelters find welcome compensation in a fairly brisk market for export. Unfortunately, pending a satisfactory solution of current labour troubles, there are only five furnaces operating on Cleveland iron, but it is satisfactory to learn that the whole of the output is going into immediate use, and stocks in makers' yards are practically non-existent at the moment, some descriptions of pig, especially No. 1 and silicious iron, being completely unobtainable. At last week's meeting of the Cleveland ironmasters prices were left unchanged, current quotations ruling as follow :—No. 1, 95s.; No. 3 G.M.B., 90s.; No. 4 foundry, 87s. 6d.; No. 4 forge, 85s.; while mottled and white are negotiable round about 80s. per ton.

In the East Coast hematite trade business continues quiet, demand having fallen away considerably of late, and stocks are accumulating. The output of hematite is now something like three times as great as Cleveland iron, and failing an early increase of consumption and shipments abroad, accumulations of stocks can hardly be avoided.

Finished Iron.

Markets for all descriptions of finished material continue depressed, with demand increasingly affected by the protracted idleness in the engineering industry for which so many products of the mills, forges, etc., are specially manufactured. In the Birmingham market last week some of the commoner qualities of bars showed further weakening of prices, nut and bolt iron, for example, having been reported done at £10 2s. 6d., and fencing iron at £10 5s. Competition for any orders for these materials seems to be very keen. Some rather low prices for crown-iron are also rumoured, but they do not represent general conditions. Most makers hold out for a minimum of £11, and there are some who will not look at less than £11 10s. Marked bar makers are still making fair outputs, but would welcome more activity in placing forward business.

Steel.

A rather more hopeful impression of the prevailing industrial troubles is now apparent in Sheffield steel trade circles, and although many of the works are still wholly or partially unemployed, there are exceptions where firms are fairly busy on foreign orders. The more optimistic opinion quoted above may probably be based upon the announcement just made by the railway companies of an extensive reduction in goods freight rates to take effect on the 22nd inst., while more encouraging signs of an early settlement of the engineers' lock-out may also affect the reopening of trade at home and abroad. Amongst the branches of Sheffield trade showing more satisfactory conditions may be numbered those employed in the production of farm, field and garden tools, while in foundry lines may be noted comparative stagnation in the manufacture of stove grates, except in connection with housing schemes, with more activity in engineers' small tools and other requisites. During the past week business in semi-products has been about the usual volume, and crucible steel makers report a few orders coming forward, but still only in small tonnages. In the West of Scotland very little change is reported, but here, again, a more optimistic feeling prevails that an improvement in conditions may be soon anticipated. On the North-East Coast steel specifications coming forward represent a tonnage entirely inadequate in comparison with capacity, and works are either operating intermittently or are remaining closed down. The export position shows no notable change, but a continuation of the American coal strike would no doubt favourably react upon the home steel trade. Quotations are unaltered.

Scrap.

With perhaps the exception of South Wales, where a considerable quantity of scrap is going into consumption, the demand for this material is very restricted, but considering the circumstances prices remain fairly steady. Some export business is doing in certain qualities of scrap, Germany, it is said, being a substantial buyer of steel and other qualities. In the Cleveland market the following may be quoted as current approximate prices :—Heavy steel scrap, 60s. to 62s. 6d.; steel turnings, 42s. 6d. to 45s.; cast-iron borings, 42s. 6d.; heavy wrought-iron piling scrap, ordinary quality, 62s. 6d.; ditto, bushelling scrap, 62s. 6d.; ditto, heavy forge, 65s.; cast-iron machinery scrap in handy pieces, 82s. 6d. to 85s.; cast-iron scrap (ordinary quality), 75s. to 77s. 6d. All delivered works.

Tinplates.

Although not quite so active as recently reported, business in the tinplate market has been favoured by a fairly moderate export inquiry, mostly from Continental sources, with prices firm on the whole. Transactions in I C 14 x 20 Cokes were reported at 19s. 4½d. per box, current rates ruling as follow :—I C 14 x 20, 112 sheets, 108 lbs., 19s. 4½d. to 19s. 6d. per box; I C 28 x 20, 112 sheets, 216 lbs., 39s. to 39s. 6d. per box net, f.o.b. Wales. A quiet demand for Coke Wasters is reported. Quotations run :—C W 14 x 20, 108 lbs., 17s. 3d. to 17s. 9d. per box; C W 28 x 20, 216 lbs., 34s. to 34s. 3d. per box; X W 28 x 20 272 lbs., 39s. 3d. to 40s. per box; C W 14 x 18¾, 110 lbs., 17s. 6d. to 17s. 9d. per box; C W 20 x 10, 156 lbs., 23s. to 23s. 3d. per box, all net, f.o.b. Wales.

Metals.

Copper.—Markets for standard copper, as a whole, maintain a remarkably steady tone, with business on a corresponding level, buying for home consumptive interests, however, being still restrained within moderate volume. American producers have again put up quotations for electrolytic, but on this side market opinion questions the ability of maintaining prices at anything like artificial levels. Speculative interest in copper is still in evidence, and substantial purchases on this account are reported, prices, however, remaining firm and steady. Closing prices.—*Cash* : Wednesday, £60; Thursday, £60 2s. 6d.; Friday, £60 2s. 6d.; Monday, £60 6s. 3d.; Tuesday, £60 10s. *Three months* : Wednesday, £60 7s. 6d.; Thursday, £60 7s. 6d.; Friday, £60 10s.; Monday, £60 13s. 9d.; Tuesday, £60 16s. 3d.

Tin.—Values in the market for standard tin have shown a declining tendency of late, due, it is suggested, to substantial realisations on the speculative side and freer selling on Eastern account. America is reported to have been a buyer at the reduced prices, and a moderate business has also been done with Continental consumers. Reports current state that some 2,000 tons of the tin held in the Federated Malay States and Batavia have been sold through channels not usually associated with the tin trade. It was obvious that these stocks could not be kept indefinitely, in spite of the affirmation of the Governments concerned to the contrary, and it appears that at last the metal is to be released. Closing prices.—*Cash* : Wednesday, £148 17s. 6d.; Thursday, £148 15s.; Friday, £149 7s. 6d.; Monday, £149 5s.; Tuesday, £148 5s. *Three months* : Wednesday, £150 5s.; Thursday, £150; Friday, £150 17s. 6d.; Monday, £150 15s.; Tuesday, £149 15s.

Spelter.—Little change has been marked recently in the market for this metal, buying being on an average level, and consumption about normal. Closing prices.—*Ordinary brands* : Wednesday, £27 2s. 6d.; Thursday, £27; Friday, £27; Monday, £27 2s. 6d.; Tuesday, £26 17s. 6d.

Lead.—Imports of soft foreign pig having been on a somewhat reduced scale, there is still some scarcity of the metal, and consequently prices are firmly held. The demand for English is fairly well maintained. *English* closing prices : Wednesday, £25 10s.; Thursday, £25 10s.; Friday, £25 5s.; Monday, £25 5s.; Tuesday, £25 5s.

Stocks.—Stocks of copper, tin, lead and spelter in the Metal Exchange during the past month were as follows :—Copper, refined, 2,544 tons; rough, 11,456 tons; unclassified, 183 tons; tin, 6,602 tons; lead, 522 tons; spelter, 6,067 tons.